ELECTRICAL REVIEW

April 11, 1947

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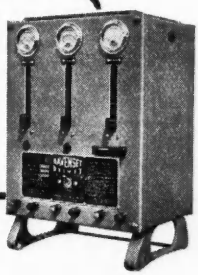

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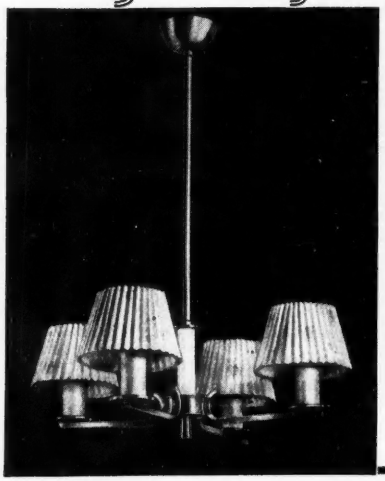

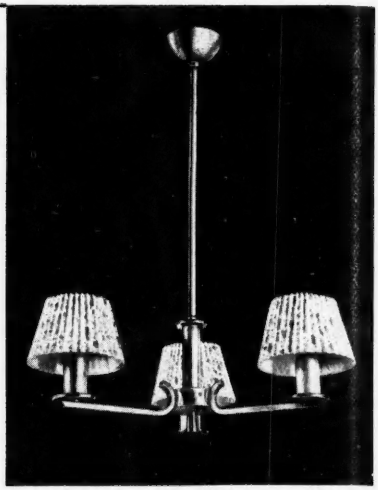

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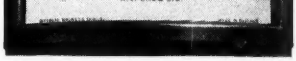

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Central Electricity Authority

Need for Confidence and Leadership

THE *principle* of nationalization of the electricity supply industry has prevailed over much opposition but *nationalization* has yet to be achieved. The very fact that so much opposition was met with in the industry should be a warning that the building of the structure of nationalization to the paper plans of the Bill will need much skill and energy as well as diplomacy if the completed structure is to hold together and produce the results so necessary to the future prosperity of the country.

Within the Industry

In the personnel of the industry we have a first-rate team of workers with a fine record of achievement. We need have little fear that either political differences or any inherent dislike of nationalization will sabotage efforts to make the new statute effective in providing the best possible service of electricity to the British public.

But the industry cannot be expected to work as a team without leadership. The responsibility for leadership will devolve primarily on the seven men who will be appointed by the Minister as chairman and members of the Central Electricity Authority. Any blunder in the selection of these individuals would destroy confidence in the entire structure. The right selection would sweep away prejudices and misgivings throughout the industry. But already rumours are circulating regarding the people who are to be given these appointments which are disquieting to the industry.

In the terms of the Bill the Central Authority is to be constituted as follows:—

(*a*) The chairman and not more than six other members shall be appointed by the Minister from amongst persons appearing to him to be qualified as having had experience of, and having shown capacity in, industrial, commercial or financial matters, applied science, administration, or the organization of workers;

(*b*) not more than four other members shall be appointed by the Minister from amongst the persons for the time being holding the office of chairman of an Area Board; and

(*c*) there shall be one other member who shall be the person for the time being holding the office of chairman of the North of Scotland Board.

Necessary Qualifications

It is not for us to nominate the seven members, much as we should like to do so, for that is the business of the Minister. We may, however, suggest certain requirements which must be met to inspire confidence. The first is that the chairman and most, if not all, of the other members should be selected from within the industry itself, and persons, however illustrious, whose names "cut no ice" with the personnel of the industry should be unhesitatingly excluded.

The members of the Central Authority should be mainly persons who have grown up with the electricity supply industry and should be selected because of their knowledge of it, either in the capacity of

administrators, or engineers or other categories as set out above. It must be remembered that the Authority will deal with broad policy and the members of it must be fitted for that task. There will be ample scope for the appointment of men with more local experience when it comes to appointments to the Area Boards and Consultative Councils. We believe that the Minister would wish that his selection of the seven members should meet with the approval of the industry as a whole, but we recognize that the task of selection is not an easy one.

Freedom of Speech

THE first requirement in a democratic community is freedom of speech (including the written word). Perhaps we are too ready to take this freedom for granted because if we adopt the realist view we find that its suppression is almost as widespread as its enjoyment. Is any employee quite free to express views which are in opposition to the policy of his employer without the fear of victimization, either by immediate action or by prejudice to his advancement? The position has been brought home to us so forcibly in the matter of the nationalization of electricity supply. There has been no free discussion by individuals either in support of or in opposition to the Government's proposals, with the very few exceptions of those who can afford the necessary degree of independence.

Valuable Advice Lost

UNLESS a complete break-up of existing organisations in the supply industry and a redispersal of personnel was inevitable, so that individuals would no longer find themselves continuing in employment amongst the same colleagues, taking either one side or the other in the nationalization controversy was unthinkable. The net result is that free discussion and the contribution of what might have proved valuable suggestions have been suppressed. Surprise has been expressed, even, we understand, by officials of the Ministry of Fuel and Power at the absence in the press of the industry of individual criticisms or recommendations. The reason for this silence, we believe, is to be found in the observations which we have made above.

The Trolley-bus

AN indirect result of the recent coal crisis is that for the time being some force is removed from one of the many arguments for trolley-buses as successors of tramcars when these become obsolete or unsuited to local traffic conditions of to-day. A vehicle that depends on home-produced coal will in due course assuredly be preferred to one which uses imported oil (which is much more expensive, even after allowing for its higher calorific value). The trolley-bus, has, of course, many other advantages, and these were discussed by Mr. J. H. Cansdale in our last issue. It is important that the case for this essentially British development, the use of which is being rapidly extended overseas, should be considered in all its bearings and not allowed to go by default.

Inventors and Taxation

IT was pointed out recently that since 1943 inventors have been liable to income tax upon lump sums received for their inventions—plainly a deterrent to the exercise of ingenuity. A correspondent to the *Financial Times* has again raised this question showing that this inequitable system compels inventors to take their inventions out of England where they can ensure production without destructive taxation. As the shape of this year's Finance Act has no doubt been settled it is probably too late to secure any alteration of the arrangements (unless the Chancellor has taken heed of the previous correspondence on the subject), but it is certainly a matter which should be dealt with as soon as possible.

World Power Conference

DEFICIENCY of power is, of course, by no means peculiar to this country. It is prevalent throughout the world, whether coal, oil or water is the source, not even Canada being exempt. As this basic want is likely to be felt for a number of years yet, the decision of the World Power Conference to devote its first post-war meeting next September to fuel economy is most appropriate. Of the British papers to be presented (listed in our last issue), the one that raises the greatest hopes of a less restricted future is Dr. J. D. Cockcroft's on the possibility of industrial applications of atomic energy.

Physical Society Exhibition

Brief Survey of Apparatus on View

THE customary display of measuring instruments with associated testing and investigational apparatus organized annually by the Physical Society, which is being held this week as usual at the Imperial College of Science and Technology, but for four days instead of three, is three months later this year than last. There are seven more exhibitors. The restriction, of necessity not from choice, of the following references to some of the very numerous items to be seen, mainly on the 119 stands in the Trade Section, does not mean that the demonstrations in the Research Section (contributed to by 29 establishments) are less worthy of inspection. The exhibition closes to-morrow (Saturday).

A.E.W., Ltd.—A miniature circuit breaker of the clip-in type has been designed for the protection of small motors and test circuits up to 15A; it cannot be re-set on load. An energy controller for heating plant and timing processing sequences consists of a mercury switch actuated by a motor-driven cam, the setting of which is governed by another similar cam. Other products are pyrometers and furnaces with easily replaceable elements.

Associated Iliffe Press, Ltd.—Representative periodicals and books of this group of thirty-one technical, trade and specialized journals include the *Electrical Review, Wireless World, Wireless Engineer, British Plastics, Iron and Steel, Metal Industry* and *Welding*.

Automatic Coil Winder & Electrical Equipment Co., Ltd.—The "Avo" electronic testmeter has been developed in a portable form for use when it is imperative that the instrument should impose a negligible loading factor upon the circuit under test; forty-nine ranges are provided and the instrument has illuminated scales, interlocking range switches and a rhodium flashed silver plated newly developed probe. A multi-range variant of the standard "Avometer" range has a specially sensitive movement, which enables d.c. voltages to be taken on high-resistance circuits without the current drain appreciably upsetting the actual voltage being measured and enables up to 5 megohms to be measured with a self-contained battery. Model 40 multi-range instrument with shunts, transformer and multiplier measures a.c. and d.c. up to 4,800 V, a.c. up to 240 A and d.c. up to 480 A.

Bakelite, Ltd.—This display exemplifies precision mouldings for the physicist and instrument maker and how metals and laminated plastics can be protected against acids and corrosion by varnish. Joints made with cements for bonding any combination of metal, glass and wood will withstand prolonged immersion in boiling water.

Baldwin Instrument Co., Ltd.—In contrast to a laboratory electrometer for measuring resistance as large as 10^{16} ohms there is apparatus for determining currents as small as 10^{-11} A; also a resistance meter for ascertaining the voltage drop in mains leads due to load on power circuits, a self-contained portable Wheatstone bridge with a range of 0·05 ohm to 5 megohms, a d.c. potentiometer with a 0 to 1·5 V range and an accuracy of $\pm$ 0·0002 V and a selection of mouldings made from amber chips.

Bristol's Instrument Co., Ltd.—Among potentiometric controllers for furnaces, it is claimed for the "Pyrodictor" that the controlled heat input is exactly proportional to the load on the plant being controlled. Two contacting galvanometers are used in opposition and their action is made positive by superimposing an additional e.m.f. at their time of making contact. Telemetering recorders include the "Metameter" system which depends upon the frequency of a source of a.c., but is independent of its variations provided they are the same at transmitter and receiver. It is also independent of changes in line characteristics.

British Electric Resistance Co., Ltd.—The "Regavolt" auto-transformer is composed of two single-layer coils wound on two limbs with brushes making contact with a track on the winding, so that the output voltage can be varied infinitely. It is made in a range of four frame sizes of from 1·25 to 3·3 kVA for outputs of from zero to 325 V from inputs of 250 V at 50 c/s. Two additional models of 3 and 6 kVA are made for compensating fluctuations in mains voltage. The power rating of toroidally wound power rheostats is doubled by embedding their windings in vitreous enamel. Resistors for heavy currents are now made of tape wound on edge for better dissipation of heat and reduction of weight-rating ratio.

British Physical Laboratories.—A light meter for testing fluorescent tubes gives direct "good, fair, bad" indications. The "Super-Ranger" multi-range test set for measuring voltage and current (a.c. and d.c.) decibels and resistance is fitted with a 5-in. mirror scale and knife-edge pointer. A mains energized breakdown tester for "flashing" components furnishes a continuously-variable output from zero up to 5,000 V (d.c. 5 mA or a.c. 10 mA) which is directly indicated by a kV-meter while insulation leakage is shown by "magic-eye" deflection. Low internal resistance is achieved by the use

of a high-voltage transformer so designed that its secondary winding can be short-circuited without inserting a large resistance in series.

British Rototherm Co., Ltd.—Quick reacting thermometers operate on the compensated bi-metallic principle, having multiple helix elements.

British Thomson-Houston Co., Ltd.—Demonstrations include an experimental three-phase squirrel-cage motor, 0·5 H.P. at 3,000 r.p.m. and a winding temperature of 175 deg C. Its stator has glass slot liners and glass tape on the end windings, both silicone treated; also glass insulated wire and flexible leads, the completely-wound stator having been impregnated with silicone varnish. All coil and cable joints are welded or brazed to withstand the high temperature. All the silicone materials were developed in the B.T.H. laboratories.

Cambridge Instrument Co., Ltd.—These measuring microscopes are laboratory standards, but capable of rapid operation for routine observations. A two-dimensional model has been made for the Astronomer Royal, an N.P.L. pattern for the Crystallographic Laboratory at Cambridge, a stereo-comparator for the War Office, a recorder of the camber and profile of steel mill rolls for Samuel Osborn & Co. and an optical bench for the Air Ministry.

R. M. Catterson-Smith.—New driving mechanism for conveyors in continuous glass-annealing and enamelling kilns is of the ratchet-lever type actuated by d.c. solenoids energized through a rectifier, speed being varied by a tilting mercury switch driven by an electric clock motor. This adaptation needs less power than normal geared motors with speed-changing device and is less costly and weighty. A small furnace for annealing the glass containers of spirit levels is arranged in two sections, with heating panels in both halves.

Crompton Parkinson, Ltd.—These measuring instruments for educational institutions and lecture theatres have an all-glass front and a cut-away scale plate showing the moving parts. A universal indicator has a 3-in. dial, and another side terminals and illuminated dial; with range multipliers, all the universal indicators are applicable as galvanometers, ohmmeters, milliammeters, millivoltmeters, ammeters and voltmeters. Among galvanometers for general laboratory work is one model with Westinghouse metal rectifier and extra self-contained ranges. All the type " OLF " and " OLFR " instruments are mounted on 45 deg inclined rubber bases, while the types " S " and " SK " wood-cased instruments are built at an angle of 45 deg.

Drayton Regulator & Instrument Co., Ltd.—In addition to examples of " Hydroflex " metal bellows, there is a new electro-hydraulic power unit for use in connection with the automatic control of temperature and pressure. It moves a valve, or damper, in one direction when the control switch is closed and in the reverse direction when the circuit is broken or the current fails.

Edison Swan Electric Co., Ltd.—An electro-encephalograph designed in accordance with the basic circuit of the Burden Neurological Institute comprises two, four or six, high-gain voltage amplifiers feeding into directly recording inking oscillographs, which have a novel bonded rubber suspension instead of the conventional spring system. An automatic analyser of low-frequency waves for use with it (also applicable to industrial vibration and strain measurements) will deal simultaneously with twenty-four unrelated components of any aperiodic waveform in the 1·5 to 30 c/s frequency range. The result may be presented as a separate record, or directly inked in parallel with the trace being analysed. The use of high-gain electronic resonant networks permits selection of recurrent components at amplitudes as low as 0·1μV peak-to-peak. The observation and recording of instantaneous fluctuations of any one frequency are possible; also phase-discriminating inter-channel analysis, while automatic averaging circuits and hand-and-channel epoch-markers are provided as well as self-cancelling networks for eliminating errors introduced inadvertently by the operator.

W. Edwards & Co. (London), Ltd.—This exhibit is arranged to illustrate the use of pumping equipment for creating high vacua as employed, for example, in the evacuated specimen enclosure of electron-diffraction cameras, for the deposition of films of metal of molecular thickness, and for centrifugal freeze drying.

Electro Methods, Ltd.—Magnetic amplifiers are made for colour comparison and the reversal of motors' driving follow-up mechanism and self-balancing devices. There are also electro-magnetic vibrators for regulating the flow of powders while being processed, non-linear resistances and surge restrictors for minimizing voltage rise when switching inductive loads, bi-metal elements for timing devices and a self-contained temperature controller.

Elliott Bros. (London), Ltd.—The greatest precision hitherto attained is claimed for an eleven-range laboratory voltage transformer designed for use with the standard N.P.L. electrometer. New iron-cored dynamometer voltmeters, ammeters, wattmeters and frequency indicators are of 3·25-in. size in hermetically sealed cases. Miniature " service " pattern deflectional frequency indicators have been patented. An improved Petch detector with self-contained illumination determines whether ironclad switchgear, busbars and high-voltage conductors are alive by distortion of the shape of liquid within a capsule. A miniature relay for use in aircraft has a moving coil with two windings arranged differentially; the sensitivity is 250 μA with a coil resistance of 200 Ω.

Evans Electroselenium, Ltd.—These photo-electric devices include a robust counter for industrial use, a relay for continuously monitor-

ing liquid density, an improved reflectometer for routing by colour comparison with the aid of filters brought into position by a knurled ring and a meter for determining slight colour differences in liquids.

Evershed & Vignoles, Ltd.—An electronic repeater over telephone lines of distant variable physical quantities is chiefly advantageous because it uses d.c. and simple indicators, the accuracy of repetition being independent of line resistance and supply voltage. A multiscope (Marchment) simultaneously indicates over one pair of wires the transitory positions of fifteen two-way switches or valves. A synchronous motor drives a wiper arm over studs in a face-plate at each end, the receiver being connected through the anode and grid circuits of a valve, so that the latter becomes conductive whenever d.c. arrives from the transmitter. A new type of vibrating relay for proportional current regulation has a " Selsyn " transmission system controlling a miniature shunt-wound servo motor. " Meg " and " Bridge-Meg " testers have been modified to comply with the intrinsic safety requirements of the Ministry of Fuel and Power; there is also a safety ohmmeter for testing detonator circuits.

Ferranti, Ltd.—A cloth guiding device utilizing a photo-cell control signal derived from the lateral position of the cloth selvedge is used to adjust the angular position of a guiding wheel, so that the cloth leaving the wheel is always correctly positioned for entry into a processing machine. The control signal is amplified and operates a split-field motor-generator which, in turn, varies the angular position of the guiding wheel. The machine has been developed in collaboration with the Tootal Broadhurst Lee Co., Ltd. Very heavy unidirectional impulse currents for the magnetization of large permanent magnets are furnished by an ignitron, with ignition controlled by a gas-filled strobotron, over any desired period not exceeding ½ cycle. The exhibit is capable of providing 200,000 ampere-turns of excitation, although still larger values are attainable. A thunderstorm recorder (Forrest patent) for power systems is also useful in laboratory investigations into discharges in insulation. It will give warning of an approaching thunderstorm amounting to several hours in some instances. The recorder is, in principle, a calibrated radio receiver; the approximate distance of a storm is deduced from the record chart and the severity assessed by the number of lightning flashes indicated on the two counters of the instrument.

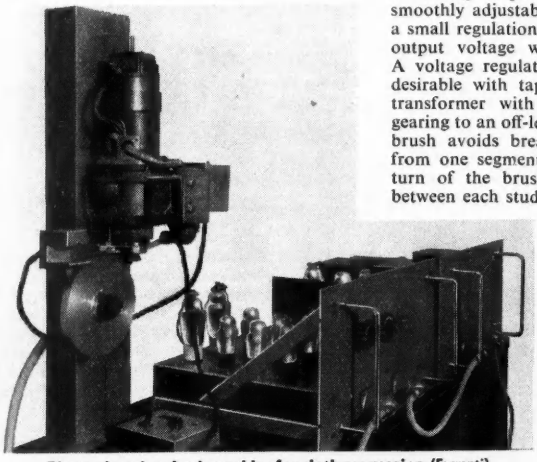


Photo-electric selvedge guider for cloth processing (*Ferranti*)

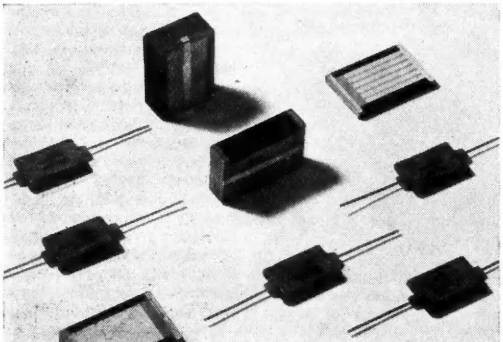
Foster Transformers & Switchgear, Ltd.—Constant voltage transformers up to 5 kVA, or greater by paralleling sets, maintain their output within ±0·5 per cent with ±12·5 per cent change in mains voltage. Waveform correction and compensation for low power factor loads can be incorporated and additional correction for ±2·5 c/s changes of frequency. A low impedance phase shifter, 2 kVA per phase, is made up of " stiff " transformers with tappings furnishing 3-phase output voltage controllable in 30-deg steps round 360 deg travel and smoothly adjustable over 30 deg travel; it has a small regulation drop, constant and balanced output voltage without waveform distortion. A voltage regulator for larger output than is desirable with tappings consists of a " stiff " transformer with a commutator coupled by gearing to an off-load switch. A copper-carbon brush avoids breaking circuit when changing from one segment to another; one complete turn of the brush arm represents movement between each stud of the off-load switch.

Gambrell Bros. & Co., Ltd.—The stability of the variable condenser fitted to a guard system for intercepting leakage has been improved by modification of its bearing system. The Schering bridge used in conjunction with a high-pressure gas condenser for measuring capacity and power factor is now provided with means of continuously recording both values. A portable potentiometer, with a reflecting galvanometer, is contained in a small case.

General Electric Co., Ltd.—The elimination of rubbing metallic contacts from tuning systems used at very high frequencies is illustrated by an oscillator unit tunable over the 500 to 1,000 Mc/s range. Capsule rectifier crystals are represented by new germanium point-contact rectifiers with a backward resistance of

200,000 ohms up to 30 V and a forward conductance of 20 mA/V at 1 V, suitable for many applications where diodes have been employed. There is a new automatic machine for making squirrel-cage grids for thermionic valves; a cap and band are loaded on to the mandrel and the machine spot welds a wire to the band, stretches the wire, spot welds it to the cap, cuts it off, then indexes and repeats the cycle until the grid is completed. Geiger-Müller counter tubes include "all-metal" types with end-windows of very thin duralumin and copper, which are self-quenching and contain a rare gas and an organic quenching vapour. A photo-electric brightness tele-pyrometer has been successfully used to measure temperature variations in glass furnaces as small as 2 deg C in 1,100 deg C. A daylight colour-matching fluorescent lamp has a luminous efficiency some twenty times that of the carbon dioxide lamp which has hitherto been used. A new class of phosphors provides a white colour of spectral quality similar to that of black body emitters, the necessity of blending phosphors for use in fluorescent lamps being thus avoided.

Hendry Relays, Ltd.—An a.c. relay for no-volt or overload control has a latch-in device and flag indicator with an external resetting lever; two 5-A, 230-V mercury switches are fitted for independent circuit control. A relay for both voltage and current protection has its two elements mounted on a common base with delay-action mercury switches to take care of momentary unstable circuit conditions. A small relay for general purpose contactor duty has precious metal contacts rated at 5 A for single-pole double-break, or double-pole single-break, with shaded winding for silence.



Precision silvered mica plate packs for stable condensers (*Johnson, Matthey*)

Johnson, Matthey & Co., Ltd.—Precision silvered mica plates assembled into packs in a form suitable for the manufacture of wax-covered condensers are examples of close tolerance eyelet assembly, especially prepared for stability in oscillators. Also fine resistance wire of various compositions, thermocouples, springs for instruments, metallized ceramics and accurately turned components.

Londex, Ltd.—A simple switch-valve for fluids consists of an electromagnet actuating a lever which compresses a rubber tube. There is a cold-cathode electronic relay for enabling any metering system to operate contacts for controlling power, temperature and humidity circuits; and photo-electric devices incorporating a cold-cathode tube and voltage stabilizer for operating magnetic counters, or switching street lamps in failing daylight.

Marconi's Wireless Telegraph Co., Ltd.—An airborne radio compass for automatic direction-finding gear is of light weight and small dimensions. Keying test equipment for quartz crystals has been combined into a single unit. A forced-air-cooled transmitting valve is a 2·5-kW triode for up to 100 Mc/s with a novel radiator needing half the air-blower power required for the normal straight-finned radiator. The Klystron amplifier valve depends upon velocity modulation, a beam of electrons passing successively through two resonant cavities, which are tunable over the 9 to 11 cm range with a power gain of 5 to 1 and an output up to 15 W.

Marconi Instruments, Ltd.—Test sets for communication apparatus include the N.P.L. type for measuring the permittivity and power factor of dielectrics within the 50 kc/s to 100 Mc/s frequency range. The set comprises two interchangeable oscillators, special test jig, square-law thermionic mirror voltmeter and stabilized built-in a.c. power pack. Among industrial recorders is an instrument for determining the electrolytic conductivity of liquids; it is a.c. mains operated, being directly electro-mechanical without employing valves.

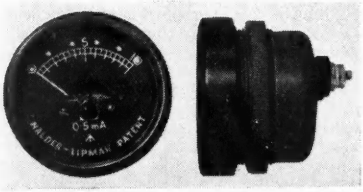
M.O. Valve Co., Ltd.—The small dimensions of the "all glass" valves, made in several types, are advantageous in normal as well as miniature and car radio sets. The pressed glass base enables the h.f. types to be operated at higher frequencies than corresponding "pinch" types.

Muirhead & Co., Ltd.—Photo-telegraphy equipment and distant indication and control by "Magslips" have already been described. A direct-reading pH meter employs a constant-grid-current electrometer, so designed that rebalancing after successive measurements is unnecessary. Associated electrode assemblies

include an enclosed and protected type for industrial determinations in open-top vats needing continuous control; at the lower end of the main tube is a glass electrode with a calomel half-cell and reservoir for KCl at the upper end, the assembly being self-flushing. Among components are slow-motion dials with readily detachable scale plates.

Mullard Wireless Service Co., Ltd.—A flash tube for the photographic examination of very-high-speed phenomena is of the three-electrode cold-cathode gas-discharge type, the third electrode being the trigger. It provides an intense flash of one micro-second duration at 7,500 V with an energy content approximating to 100 joules. New industrial power valves have silica envelopes, which reduce their dimensions and weight, avoid any need for forced air or water cooling and all but the smallest types are repairable. There are seven types for outputs of from 130 to 7,000 W at from 150 to 15 Mc/s. Cathode-ray oscillographs are specially designed for unusually low frequencies as well as for h.f. investigations.

Nalder Bros. & Thompson, Ltd.—Miniature galvanometers shown for the first time are claimed to be the smallest and lightest moving-coil type yet produced. The measuring element is 0·6 in. in diameter and its total weight is



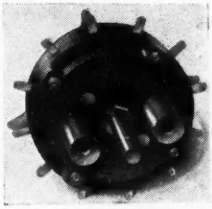
Hermetically sealed 1·5-in. moving coil micro-ammeter. (*Nalder Bros.*)

about 10 grammes. A portable model has a centre zero scale and a range of 50-0-50 μA with a coil resistance of 70 ohms. Another movement, mounted in a 2-in. diameter glass case, has a range of 800-0-800 μA with a coil resistance of 10 ohms. The moving coil, weighing less than 0·2 gramme, works in the air gap between an internal permanent magnet and an outer mild-steel tube which provides the return path for the magnetic flux and also serves as a magnetic shield against the effect of external stray fields. A hermetically sealed 1½-in. diameter microammeter of a similar design is water, shock and vibration proof.

Philips Lamps, Ltd.—An X-ray spectrometer is now available with a Geiger counter and automatic chart recorder for quantitative and qualitative analysis. It has in certain cases advantages over conventional diffraction procedure, which entails exposure and development of film besides measurement and computation. A scanning device having a Geiger tube arranged to traverse a graduated quadrant is used in combination with measuring circuits. The electronic scaler incorporates a pulse amplifier and invertor, limiter, electronic timer and test multivibrator. It controls the pulses from the Geiger counter and the electro-mechanical counter used in recording radiation intensity.

Plessey Co., Ltd.—This selection of testing equipment, mostly for radio purposes, includes precision instruments made to customers' own specification. A bridge outfit for determining, during production, the capacity to ± 1 per cent and power factor to ± 2 per cent of electrolytic condensers at 50 c/s has ranges up to 8,000 μF in increments of 0·01 μF and up to 50 per cent p.f. in steps of 1 per cent; d.c. at up to 1,000 V may be applied to the sample under test. Balance is observed on a cathode-ray tube with a 50 c/s sinusoidal time base, the face of the tube being recessed as a protection against extraneous light.

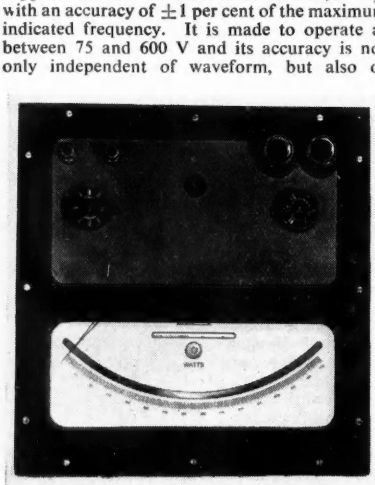
Salford Electrical Instruments, Ltd.—A self-cleaning decade switch has a laminated phosphor-bronze rotor assembly and a strong click-mechanism ensures positioning. The shaft is completely insulated from the rotor and contact studs, the latter being brought out individually to soldering tags; four of them are evenly spaced on the circumference for connection to the rotor. Twelve contacts, two extra studs and 30-deg spacing, simplify dial calibration. The switch is 2¾ in. in diameter and 1¼ in. deep. A six-channel electronic blast pressure recorder will accurately measure photographically the amplitude, relative phasing and time duration of independent pressures occurring in less than two seconds or more than ten micro-seconds if convertible by pick-up into electrical energy of more than 1 mV, to be fed into six amplifiers whose several outputs deflect the beams of six separate cathode-ray tubes. The traces are focused optically on to a revolving photographic drum.



Self-cleaning decade switch with laminated rotor (*Salford*)

Sangamo Weston, Ltd.—The new range of 12-in. scale moving-coil and dynamometer instruments includes ammeters, voltmeters and single, double and triple element wattmeters, with high accuracy. New 6-in. scale laboratory sub-standard portable instruments are of the moving-coil, repulsion moving-iron and dynamometer types, the wattmeters being supplied in three forms, for d.c. and a.c. commercial frequencies, for low power factor circuits and for frequencies up to 1,000 c/s. A two-element wattmeter is also supplied for normal three-phase three-wire circuit measure-

ments. Model "S105" frequency meter operates on a novel principle; it consists of a ratiometer type movement with a special rectifier circuit and sine-wave filter. It can be supplied to indicate between 25 and 15,000 c/s with an accuracy of ±1 per cent of the maximum indicated frequency. It is made to operate at between 75 and 600 V and its accuracy is not only independent of waveform, but also of



12-in. scale laboratory standard wattmeter (*Weston*)

changes up to 33⅓ per cent in the supply voltage. It has a 6-in. scale and is available in both portable and switchboard patterns.

Siemens Electric Lamps & Supplies, Ltd.—Krypton-xenon filled "Sieflash" tubes coiled within a glass envelope mounted on a three-pin base for high-speed photography, stroboscopy and Wilson gas chamber work include a type with a flash duration of 1 to 2 microseconds and others for colour photography. A photometer has been developed for determining the relationship between the arc brightness of mercury-vapour lamps and the physical constants of the arc. For investigating phosphorescent luminous powders, they are coated on glass plates which are interposed between a source of ultra-violet radiation and a photocell, the output of which is amplified and passed to one beam of a cathode-ray oscillograph while a second beam serves as the zero base line or to indicate the waveform of the lamp current.

Standard Telephones & Cables, Ltd.—Monitoring equipment for indicating change of frequency in power supply mains determines the frequency to 0·01 c/s with an accuracy of 0·1 per cent within the 47 to 50 c/s range; rate of change is shown to ±0·01 c/s per min up to 0·2 c/s per min maximum and the integrating period may be changed if required. The method is multiplication for comparison with a crystal controlled standard, the resultant being "counted" in a stabilized circuit and indicated on large meters. The rate of change is found by "sampling" with "storage" for comparison at succeeding time intervals with indication by centre zero meters. The equipment is self-monitored by a built-in calibrator. An impulse modulated telemetering system enables impulses derived from kWh meters to be translated into kW indications, while electronic teleprinter impulsing is the means of conveying the information over great distances.

Sunvic Controls, Ltd.—A highly-sensitive device operating at high speed in conjunction with an electronic amplifier and recording milliammeter will measure deviation of temperature (resistance thermometer) with a full scale width set as low as ± 0·1 deg C and indicate the manner in which the desired temperature is approached. A feed-back circuit minimizes error caused by the finite power absorbed by the balance detector and a limiting circuit enables the scale of the instrument to be compressed to any extent outside the desired range. A resistance thermometer controller with a sensitivity better than 0·1 deg C is operated electronically by out-of-balance current from a bridge circuit discharging a thyratron; the only moving part is the final vacuum switch and the bridge circuit is sensitive to a change of resistance in the thermometer of one part in five thousand. A proportioning thermocouple controller for furnaces combines electronic and photocell actuation.

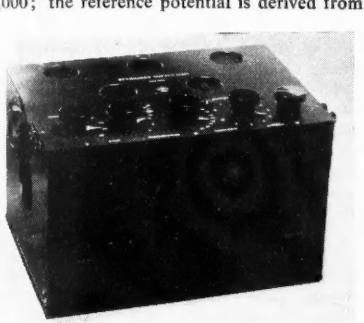
Taylor Electrical Instruments, Ltd.—Mains-energized test sets mostly for radio and allied purposes include the 40-range model "90A" with two selectors, 12-position switch and four scales for volts, amps (d.c. and a.c.), resistance, capacity and decibels, while a buzzer with internal battery provides audible indication of circuit continuity. The mirror scale is 4 in. long, "Alnico" magnets and wire-wound resistances are fitted, while the moving coils are wound of enamelled copper wire on very light aluminium formers suspended on polished steel pivots between jewelled screws.

Telegraph Condenser Co., Ltd.—A power factor controlling system automatically varies the leading current of a capacitor in accordance with the wattless component of the load current, which is effected by changing the voltage applied to the condenser by means of a regulator; the advantages claimed are exact compensation under all conditions of load, absence of heavy contactors and quiet operation. To reduce their dimensions, mica radio-transmitting capacitors of 600 kVA at 12 kV are oil-immersed in cylindrical cast finned containers; other types of 100 and 300 kVA with copper fins on the electrodes are cooled by forcing air directly on to the mica stack.

Telegraph Construction & Maintenance Co., Ltd.—For constructing telecommunication cores, magnetic strip is made up from vacuum-melted nickel-iron cold rolled to a high degree for im-

parting a preferred grain orientation, in which state the hysteresis loss of the strip is extremely small. A new type of carrier-frequency cable designed and developed by the T.C. & M. Co. on behalf of Submarine Cables, Ltd., for the G.P.O. is insulated with "Telcothene" and will provide 100 duplex telephone circuits over a length of 82 nautical miles without an intermediate repeater. Similarly covered flexible cable avoids the minute spurious voltages normally developed when the cable is flexed or subjected to impact. Highly stable cable for 10,000 Mc/s is braided with silver-clad copper wire. Double braiding materially reduces the electro-magnetic field leakage from a flexible coaxial cable. A velocity of propagation relative to that of light extending from 0·01 to 0·15 is obtained by forming the inner conductor as a helix, thereby loading the cable with series inductance. A highly flexible cable insulated with a vulcanized synthetic plastic of low power factor has been introduced for high-frequency medical equipment.

H. Tinsley & Co., Ltd.—One of two stabilizers for meter test rooms is electronic (Arvon Glynne, *I.E.E. Journal*) operated from a.c. mains, furnishing a d.c. output of 120 mA at 22 to 600 V, respectively stable and variable to one part in 50,000; the reference potential is derived from



Electronic stabilizer for meter test rooms (*Tinsley*)

internal dry batteries. The other utilizes a photo-cell, providing 120 mA with a stability of one in 150,000 at from 50 to 600 V, which can be set with potentiometer accuracy as a single Weston standard cell is used for the reference potential. Other new instruments include an oscillograph for sound film recorders with a flat response up to 10,000 c/s, a self-contained magnet of unusually small overall dimensions; improved electrical strain gauges and meter and new universal geophysical prospecting equipment utilizing a commutator a.c. potentiometer.

Ernest Turner Electrical Instruments, Ltd.—For checking circuits at different points concurrently there is a twin instrument with two moving coils so mounted in the same case that their pointers, of different colours, cover the same portion of the single dial with the same damping and speed. Greater a.c. ranges, 10 kV in the 3·5 in. size and 15 kV in the 6 in., than are usually possible without external multipliers are claimed for newly designed electrostatic instruments. One comprises a hollow vane with generous radii produced by the electro-deposition of metal on wax moulds; the other has moving vanes with smoothed spun edges to minimize brush discharge. The 3·5- and 6-in. differential instruments have a movement consisting of two insulated windings; the coils are matched and one direct reading can give the result of adding, subtracting and balancing the currents in the two coils.

Westinghouse Brake & Signal Co., Ltd.—Developments of the double-voltage "Westalite" metal rectifier include a 9-lb model (6·2 kW) for jet-propelled aircraft, with an output of 210A at 30 V. Reduction of size and cost now make it possible to combine a rectifier with alternator for pedal-cycle lamps; prototypes in sealed cases are suitable for bridge and centre-tapped circuits, while similar lighting of motor-cycles and motorcars may have advantages over the use of dynamos. Abandonment of graphite as a contact material on the surface of copper-oxide rectifiers has improved their stability and avoided the ill effects of moisture; "miniaturization" and hermetic sealing are proceeding while the reverse characteristic (very short curvature at a critical voltage) has been utilized to make voltage limiters for protecting condensers against surges in railway signalling track circuits and for communication apparatus. "Noregg" equipment for furnishing d.c. at constant voltage in place of batteries without relays, barreters, or saturated chokes, is now available in sizes of from 40 W to 1·2 kW. The a.c. voltage "Stabilistor" is made in 30 to 1,200 VA sizes.

Wild-Barfield Electric Furnaces, Ltd.—Laboratory muffles have been redesigned. The door gear of the rectangular models is totally enclosed; one has a built-in energy regulator with pilot lamps and the temperature of another is regulated by a separate panel. Both have mercury door switches and one of them is fitted with fusible excess temperature cut-out. One tube muffle is enclosed in an enamelled steel case with pilot lamps and an energy regulator operated by hand in the base. Another is molybdenum wound, with provision for introducing a suitable atmosphere to protect the winding at high temperatures.

Zenith Electric Co., Ltd.—The latest duplex "Variac" voltage regulating transformers incorporate two regulating mechanisms, enabling two separate circuits to be controlled independently of each other. In another type the core is constructed over rolled strip in place of the ordinary annular stampings, so that both iron and eddy current losses are greatly reduced.

Among meter testing equipment is a phase-shifting transformer for direct indication of both power factor and angle of "lead," or "lag."

Views on the News

Reflections on Current Topics

AFTER the coldest winter (December to February inclusive) for the past 133 years, it is some comfort to deduce from data compiled by the Northmet Co. that two abnormally severe winters rarely occur in succession. Only once during the past century has that happened and the gap between them has been as much as 24 years. This illustrates the difficulty of devising heating systems which will provide adequate warmth under any conditions of the British climate without leading to capital expenditure that would be excessive for average winters. Specifications calling for the maintenance of given internal temperatures without reference to minimum external temperatures are without any secure basis for comparison of tenders and may lead to over-insurance against infrequent happenings.

* * *

Mr. Shinwell truly said, in last week's fuel debate, that rationing of gas and electricity is impossible without imposing hardships on the consumers and appointing an army of officials. It is pleasing to see that he has come round to the view which has been expressed in this journal time and again since the rationing scheme of 1939 was put forward. But does Mr. Shinwell realize that the present restrictions upon electricity consumers also inflict hardships upon people who rely entirely upon electricity for cooking or water- and room-heating? If he does, why has he announced that these restrictions are to be continued while, for the time being, gas consumers remain free? Education and appeals to common sense and civic responsibility are the only feasible means of securing economy, as I have said before. There is also a strong case for an appeal to the miners, on behalf of the rest of their countrymen, for in the final reckoning they are the only people who can bring about any real improvement.

* * *

I think that Mr. Glenvil Hall was both flippant and unjust when he told the Standing Committee on the Electricity Bill that nationalization would kill the companies and the proper thing to do was to bury them as quickly as possible. The flippancy is evident but the injustice may not be so apparent after the vilification to which the companies have been so much subjected. While they have been unashamedly profit-making concerns they have rendered immense service to the community and hundreds of thousands of people would have been without electricity but for their work. It is possibly true that *intensive* electrical development has been largely the work of municipal authorities in their more favourable areas, but the *extensive* spread of electricity, even to remote villages, must be credited to the power companies and their associated distribution concerns. On balance they have been benefactors—not malefactors as Government spokesmen seem to imply.

* * *

Last week I had the opportunity of meeting Miss Joan Whitgift, who has recently returned fron the United States which she visited as the first holder of the Caroline Haslett Travelling Exhibition in Electrical Housecraft. She had some interesting things to tell me about the design and popularity of domestic electrical equipment in America, where, owing to the higher standard of living, the housewife has a greater number of appliances at her command. Miss Whitgift was particularly impressed with American cookers, which she considers compare favourably with our own equipment. Features which attracted her notice were the quick-heating oven, a deep cooking well and various attractive "gadgets."

* * *

In this country there is a widely-held belief that the United States is a country in which almost every house is equipped with every modern convenience. Yet it is doubtful whether on the whole American domestic arrangements are as good as ours. Mr. Eric Underwood, writing to *The Times* from Philadelphia, asserts that only one-half of the five million American homes have electricity, one-quarter have main water supply, one in six a bathroom and one in seven central heating.

* * *

One reason given by men engaged on the Loch Sloy hydro-electric scheme for stopping work last week was that their canteen tea was too watery. This somehow reminds me of the remark of Old Noah in the verses in Chesterton's *Flying Inn*:—"I don't care where the water goes if it doesn't get into the wine."—**REFLECTOR.**

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

"The Crisis—and After"

IN his comments (in your March 28th issue) Mr. W. Puckey quite rightly deprecates long-term application of a restrictionist policy in electricity supply. However, the antonym to *laissez-faire* is not necessarily "restrictions." but "planned development." The pioneers of the industry spent a lifetime in endeavouring—very successfully—to flatten the lighting peaks and to develop all-the-year-round uses of electricity. Now, a situation has arisen in which well over a million kilowatts of generating plant has to be provided at almost three times the pre-war cost and at the expense of vital export requirements, to cater for a load which occurs only during a few days of the year; while at the same time many thousands of kilowatts of good industrial load are being lost to Diesel engines.

Mr. Puckey also refers to the difference in annual consumption between domestic consumers in this country and the United States. For 1945, the figures are, roughly, 800 and 1,200 kWh per consumer. Of the latter, about 20 per cent is due to refrigerators, an ideal load from the point of view of the electricity supplier, and very little is accounted for by space-heating.

The most urgent task of the electricity supply industry in this country seems to be to combat the sky-rocketing of demand upon the thermometer settling down below freezing point for a few days. Several constructive proposals have been made, which would ease matters without the bogey of "restrictions." As several other industries are involved (building, heating, water supply, etc.), the next step should be the setting-up of a comprehensive committee.

"ELECTRICUS."

Lighting Urban Centres

WITH reference to the editorial notes and the article by Mr. J. G. Christopher in your issue of March 21st, the amount of light advocated seems unnecessary considering how many third-class streets are adequately lighted with low-intensity filament lamps. The author seems to recommend a light that will compare with daylight, which to my mind is unnecessary and well-nigh impossible. The idea that we should "turn night into day" is mistaken. Should not science rather help us to relax somewhat after the day's activities consistent of course with safety?

Many of the author's recommendations seem grossly uneconomical—for instance, a mounting height of 30 ft above the road. Glare could be avoided with half that height by the intelligent use of the old tungsten-filament lamp.

The amount of material involved in a lantern containing seven fluorescent lamps (35 ft of glass tubing, 14 brass caps, the lantern itself with its series of aluminium reflectors, etc.) seems excessive in these days when economy, both material and financial, is necessary. A better light distribution could be produced with a 750-W tungsten lamp in a less unsightly fitting costing much less to install and maintain with consequent reduction in man-power and materials. There would also be a saving of coal. Surely the view that the public rapidly becomes accustomed to the colours of light from the mercury or the sodium lamp is wishful thinking due to the disinclination of the general public to make a fuss. I have yet to meet anyone who does not dislike them.

*London, W.C.*1. G. V. DOWNER.

[It is of course correct that many third-class streets are adequately lighted by filament lamps, but the subject of the article was the better standard of illumination desirable in certain main streets of major importance. The reference to coal saving appears to be due to a misapprehension, as the contrary was clearly indicated in the article in question.—*Editors, Electrical Review.*]

The Need for Dish-Washers

YOUR report of the Ideal Home Exhibition mentions one dish-washer only, and I know of only one other in prospect. Yet dish-washing probably takes up more time than anything else in the home. The crude method of sink washing and hand drying is the cause of nearly all the breakage and chipping; this is greatly reduced with a dish-washer. There are difficulties in design, and in production at a satisfactory cost, but they can be overcome.

A water-heater giving water at 180 deg F

must be incorporated as part of the equipment, also a pressure pump. The process should be: (*a*) Rinsing in ordinary hot water, and a good readily renewable filter for bits of food is required here; (*b*) washing in soapy water; (*c*) rinsing again in clear, very hot water (180 deg F) so that the dishes will dry by evaporation, no wiping or drying cloths being necessary.

Construction must be rustless and preferably in a metal such as stainless steel or monel metal; vitreous enamel is not good. The racks must be small and handy for standing while the dishes dry, in fact it should be unnecessary to move the dishes from them until they are required for the next meal; additional racks should therefore be cheap.

A price above £50 will be far too high; £20 would be better, but it is doubtful if a satisfactory design incorporating a water heater and pressure pump could be made for that sum. Hire-purchase will almost certainly be necessary.

Needless to say the process, which is very wet and messy inside, must not leak anywhere or cause mess outside, and the motor and all switches must be watertight or thoroughly splash-proof.

Belfast. H. MACEWAN.

Billiard Table Lighting

FLUORESCENT lighting for billiard tables was tried out in West Africa at least two years ago. It proved entirely satisfactory. I agree that the colour of the balls was enhanced—the red being rather dark. The setting of the cut-off was carefully gauged by experiment to avoid shadows. Two tubes end on along the table centre gave good results.

I heard of no complaints from spectators—which is in itself unusual for West Africa!

Newmarket. E. W. C. DAY.

Australian Notes

From Our Correspondent

THE national scheme which is to be submitted to a Commonwealth committee for the use of the Snowy River waters will, it is estimated, have nearly three times the capacity of Yallourn (Victoria), nearly four times the output of Bunnerong (New South Wales) and at least six times the prospective output of the Kiewa (Victoria) scheme. Five large power stations are envisaged, but it will be many years before the undertaking can be completed.

The Minister for Supply (Senator Ashley) states that the Bunnerong plant is inadequate for Sydney's needs and proposes a chain of power stations on the coalfields. But it has been pointed out that it would be difficult to obtain the necessary equipment.

Coal and Water Supplies

The Western Australian State Electricity Commission announces that it intends to produce its own coal for its South West power scheme. At the same time it is interesting itself in a proposed comprehensive water scheme for the Great Southern districts, for the economic operation of the power scheme depends to a large extent on the establishment of this water scheme.

New generating units for the Geraldton power house are to be supplied by Harris, Scarfe & Sandovers, Ltd., Perth, at a cost of £32,521. R. & C. Thomas Bros. Pty. Ltd., are to erect a new factory at Tottenham (Victoria) for the manufacture of electric motors.

Thousands of electrical appliances, including radio sets, refrigerators and electric irons were damaged upon the sudden restoration of power in Sydney after a recent "black-out." Some were completely ruined, and as it is contended that the fault lies with the Bunnerong power station authorities, efforts are being made to secure compensation for owners.

Supplies of electrical goods have shown a considerable increase during the past few months. Electric irons are now freely obtainable; electric fans have been selling fairly well; plastic fittings are in good supply; but the demands for refrigerators and vacuum cleaners are still well ahead of the supply.

Electrical Imports

During the fiscal year 1945-46 (ended in September) imports into Australia of electrical appliances and equipment totalled £5,281,000, compared with £6,446,000 in 1944-45. The principal items are shown in the following table:—

	1944-1945 £ Stg. (000)	1945-1946 £ Stg. (000)
Batteries and accumulators ..	202	84
Cable and wire, covered ..	662	610
Dynamo-electric machines ..	778	1,076
Lamps, filament	108	169
Telegraph, telephone instruments, etc.	1,380	1,116
Other electrical appliances ..	3,316	2,226

During the same period electrical appliances and equipment were exported to the value of £A537,000, as compared with £A350,000 in 1944-45.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Lord President of the Council has made new appointments to chairmanships of Research Boards of the Department of Scientific and Industrial Research from April 1st. These include **Sir Stanley Angwin** (chairman of Cable & Wireless, Ltd.), who has been appointed chairman of the Radio Research Board in succession to Lt. Col. Sir George Lee, O.B.E., M.C., M.I.E.E., and **Engineer Vice-Admiral Sir Harold Brown,** who succeeds Sir Harold Hartley as chairman of the Fuel Research Board.

Dr. G. W. O. Howe, who recently retired from the Chair of Electrical Engineering in Glasgow University is to receive the honorary degree of Doctor of Laws of the University in June.

Mr. J. Eccles (Liverpool) has been nominated to succeed Mr. J. S. Pickles (Dumfriesshire) as president of the Incorporated Municipal Electrical Association, and **Alderman G. B. Brooks,** O.B.E., has been nominated for the position of vice-president for the ensuing year.

Mr. A. W. A. Dick-Cleland, B.Sc., A.R.T.C., A.M.I.E.E., has been appointed general manager of the Trafford Park Works of Lancashire Dynamo & Crypto, Ltd. Mr. Dick-Cleland was educated at Kelvinside Academy and the Royal Technical College, Glasgow, obtaining the degree of B.Sc., with honours in electrical engineering of Glasgow University. He served his apprenticeship with Fraser Borthwick, Ltd., Glasgow, and subsequently was assistant to the chief design engineer of the Harland Engineering Co., Ltd., and later induction motor design engineer with the General Electric Co., Ltd., Witton. In 1932 he commenced business in Glasgow, later being appointed Scottish manager for Newman Industries, Ltd. He served in the Electrical Branch of the R.N.V.R., attaining the rank of commander. He was demobilized in 1945 and joined the London sales staff of Lancashire Dynamo & Crypto in January, 1946.

Mr. F. G. Holmes, late of the Barrow Haematite Steel Co., Ltd., has been appointed commercial manager of Max-Arc Welders, Ltd., and the Max Electric Co., Ltd.

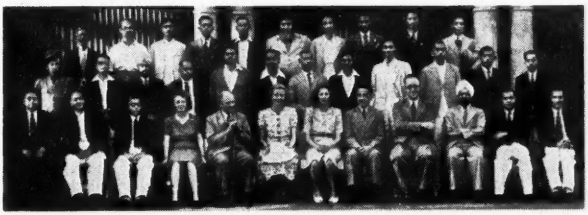
Mr. T. D. H. Hogg, A.M.I.E.E., has been appointed assistant power station superintendent at the Neepsend power station of the Sheffield Corporation Electricity Department. Mr. Hogg graduated B.Sc. in electrical engineering in 1928 at Edinburgh University, and received his practical training with the British Thomson-Houston Co. at Rugby. He joined the Sheffield undertaking in 1938 as a junior assistant engineer at the Blackburn Meadows station, and he is at present charge engineer at that station.

Mr. H. V. Potter, managing director of Bakelite, Ltd., has been elected to the Grand Council of the Federation of British Industries. Mr. Potter is president of the Institute of Plastics.

The consulting practice carried on since 1911 by **Mr. A. B. Mallinson,** M.I.Mech.E., M.I.E.E., is now operating as A.B. Mallinson & Co., the partners being Messrs. A. B. Mallinson, A. C. Mallinson and R. F. A. Mallinson, M.B.E.

Long Eaton Urban District Council has decided to retain the services of its electrical engineer, **Mr. J. B. Feltham,** until electricity supply is nationalized. Mr. Feltham was to retire on March 31st.

In our issue of January 21st we reported that **Mr. W. G. Hendrey** and **Mr. W. H. McFadzean,** directors of British Insulated Callender's Cables, Ltd., had left for India on a visit to the company's branches. The accompanying



Senior staff of the Indian Cable Co., with Mr. W. G. Hendrey and Mr. W. H. McFadzean (directors of B.I. Callender's Cables) and their wives seated in the front row

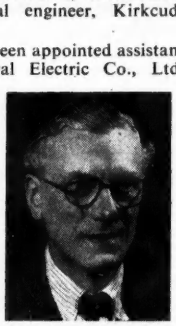
picture, which was taken during their visit to the Indian Cable Co., Ltd., at Tatanagar, Bihar, shows Mr. and Mrs. Hendrey and Mr. and Mrs. McFadzean with the senior staff of the factory of the Indian Cable Co.

Mr. A. Gardner, Aberdeen electrical engineer, **Mr. P. Phillip,** Dundee electrical engineer, and **Mr. N. B. McArthur,** Inverness electrical engineer, accompanied by **Mr. W. Guthrie,** chief electrical engineer of the North of Scotland Hydro-Electric Board, are visiting Switzerland as a mission of inquiry. It is hoped to solve some of the problems of the Board during critical periods of drought and severe frosts.

Mr. W. H. Wills, M.I.E.E., deputy county electrical engineer of Dumfriesshire, has been

elected president of the Dumfries Electrical Society. The vice-president is Major J. Lindsay Drummond, M.C., and the secretary and treasurer Mr. D. M. Thornton, A.M.I.E.E., deputy county electrical engineer, Kirkcudbrightshire.

Mr. T. B. O. Kerr has been appointed assistant secretary of the General Electric Co., Ltd. Mr. Kerr joined the company in 1930 and after a short while went over to the Sales Department in London. In 1932 he was appointed to the staff of the late Mr. M. J. Railing and in 1935 become personal assistant to Sir Harry Railing, then Dr. Railing. He held this position up to the time of his new appointment.



Mr. T. B. O. Kerr

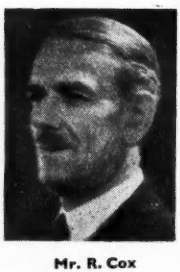
Discussions have taken place between the Nelson and Colne Town Councils on the suggested appointment of **Mr. T. D. Martin** as joint electrical engineer for both towns. The Electricity Committees are again to consider the matter before another joint meeting.

Mr. F. R. Axworthy, A.M.I.E.E., was married on Saturday last at Christ Church, Radlett, Herts, to Miss K. M. Ford. Mr. Axworthy is a member of the staff of Everett Edgcumbe & Co., Ltd., and his wife was, until recently, also a member of the staff.

Mr. G. W. E. Hooper, secretary of the English Electric Co., Ltd., has been elected to the Council of the Chartered Institute of Secretaries. Mr. Hooper is a Fellow of the Institute.

Mr. W. H. Myers, chief electrical engineer, N.S.W. Railways, has been awarded the Peter Nichol Russell Memorial Medal of the Institution of Engineers of Australia.

The Yorkshire Switchgear & Engineering Co., Ltd., has decided in view of its world-wide activities to appoint a sales director to look after its interests in this connection. **Mr. R. Cox,** who has been the London manager of the company for the past twenty-six years, has been appointed to the board and will be responsible for the sales of the company, and also those of the associated company, the Electro Mechanical Manufacturing Co., Ltd. Mr. Cox commenced his career with Dick, Kerr & Co., Ltd. in 1906, and joined the Yorkshire Switchgear & Engineering Co., Ltd. (then the Tramways Supplies, Ltd.) in 1921. His headquarters will be the London office of the company.



Mr. R. Cox

Mr. M. T. Greenwell has retired from the position of assistant general secretary of the Electrical Trades Union on account of ill-health. He had been an officer of the union since 1919 and assistant general secretary since 1924.

Mr. J. C. Snelling, tool room foreman of Bull Motors (branch of E. R. & F. Turner, Ltd.), Foxhall Works, Ipswich, was recently presented with a cheque on his retirement after over fifty years' service with the company. Mr. A. Leggett, M.B.E. (chairman and managing director), made the presentation. Tributes and presentations were also made on behalf of the staff and Mr. Snelling's colleagues in the tool room.

Mr. A. Stewart, of the East Anglian Electricity Co., has been appointed consumers' and installation engineer with the Bedford Corporation electricity undertaking.

Mr. C. A. Gillam, A.C.A., has been elected a director of Tilling-Stevens, Ltd.

Mr. L. C. Ramsden, mechanical superintendent at Doncaster electricity works, retired on March 25th, his sixty-fifth birthday, after having been with the undertaking for twenty-six years. He has left Doncaster to spend his retirement at Bridlington.

Obituary

Mr. R. W. Biles.—We report with regret the death, on March 30th, at the early age of fifty-one, of Mr. Reginald William Biles, chairman of the Western Centre of the Institution of Electrical Engineers. Mr. Biles was trained at Faraday House, and after serving in the Royal Flying Corps during the 1914-18 war became an engineer in the Technical and Research Department of A. Reyrolle & Co., Ltd. In this position he was responsible for the design of a number of protective gear schemes. He went to the Northmet Power Co. as technical assistant in 1927 and three years later was appointed technical engineer in the South-West England and South Wales Area of the Central Electricity Board. He became operation engineer in 1937. Mr. Biles was awarded the Willans Premium of the I.E.E. for 1946 for a paper on "Standards of Performance of Generating Plant."

The late Mr. R. W. Biles

Mr. G. W. Wyles, A.M.I.E.E., chief signal and electrical engineer of the New Zealand Railways Department, died recently aged fifty-nine. Mr. Wyles was educated at King's

College and Finsbury College, London, and served with the Sykes Interlocking Signal Co., the London & South-Western Railway, and the Bombay, Baroda and Central India Railway before going to New Zealand in 1916. Among the works carried out under Mr. Wyles's direction was the electrification of suburban lines at Wellington and Christchurch.

Mr. George A. Lipscombe, of the chief engineer's department of the London and Home Counties J.E.A., died on March 30th. Mr. Lipscombe joined the Authority's staff in 1931. He was educated at St. Olave's and St. Saviour's Grammar School. In 1907 he joined Siemens Bros. Dynamo Works; later he was transferred to the English Electric Co., Ltd. During the 1914-1918 war he served in the Royal Engineers and from 1920 until joining the Authority he was engaged in publicity, advertising and photography for electrical, steam and traction engineering.

Mr. T. D. Cartwright.—The death occurred on March 28th of Mr. Thomas Douglas Cartwright, partner in the firm of John T. Cartwright & Sons, electrical distributors, St. Vincent Street, Glasgow.

Wills.—Sir Thomas E. Higham, D.L., J.P., of Accrington, chairman of the Mid-Lancashire Electricity Board, who died on January 22nd, left £61,383 gross (net personalty £42,075).

Mr. C. W. Bridgen, a director of Ferranti, Ltd., who died on November 18th last, left £7,351 (net personalty £7,023).

Mr. J. R. B. Gall, M.I.E.E., late of the G.P.O., left £2,625 (net personalty £546).

Novel Batteries

British and American Developments

SOME two years ago the British Electrical and Allied Industries Research Association commenced to investigate a proposed method of storing electrical energy in a "fuel" cell, the gases being formed by a reversed electrolytic process. The development of this novel type of battery, based on the electrochemical catalysis of oxygen and hydrogen gases, is now proceeding on behalf of the E.R.A. at Cambridge University.

Magnesium Cells

At the beginning of the war an urgent need arose for a battery of small size and extremely light weight, but capable of delivering a large output. That requirement was satisfied by the development in the United States of a primary cell of the reserve type, which can be stored indefinitely in the dry state.

When activated for use with common tap water the cell is capable of delivering a large output rapidly (not short circuit flash) at a voltage which rises initially, then remains nearly constant at 1·5 V on load, finally declining rapidly to 0·3 V.

A cell of $1\frac{3}{4}$ in. diameter by $2\frac{3}{4}$ in. long delivered 100 A at a peak of 1·4 V for 1·5 minutes. Such performance is not a laboratory curiosity, but representative of the capabilities of production models.

The positive electrode is a silver foil 0·001 in. thick, coated with electrolytically formed silver chloride on both sides, on to which wire leads are welded. The negative electrode is a commercially pure magnesium foil, of the same width, to which a wire lead is similarly welded. The two foils are wound spirally together, with dry absorbent paper between them, so forming an interleaved cylindrical cell that is completely inert when dry.

A battery of two, or more, cells is conveniently made by wrapping the first with a layer of insulating plastic film, or varnished paper, upon which the second cell may be wound and so on. This "concentric capsule" construction saves space and weight when high and low rates of discharge are needed at low voltage. For small outputs at high voltage the flat cell form is preferable, the area ranging from 0·59 to 2·625 sq in. Chloride is formed on one side only of the silver sheets, the plates being stacked with absorbent paper between the electrodes of each cell and insulation between adjacent cells.

These cells are manufactured at a temperature of 80 deg F and absolute humidity of 0·0045 lb of water per lb of dry air (dew point at 38 deg F) in which atmosphere they are packed in sealed cans with a small quantity of silica gel as desiccant for storage.

Discharge may commence after removal from the water (in which the cell is immersed to saturate the absorbent paper between foils) or while immersed continuously (low voltage type) to obviate any need for an electrolyte container.

The large-scale production of this kind of battery in 21 different types by the Burgess Battery Co., Antioch, Ill., U.S.A., is described in considerable detail in a paper (reprint 90–33) of the Electrochemical Society of America.

Cell Dynamics

Another paper (reprint 90–38) of the same Society is a study of the relationship between the AL capacity of and output drain from a dry cell. The application of Kirchoff's law to a simplified model of a bobbin has demonstrated that on light and medium loads the current is distributed almost uniformly.

This means that each particle of a cell suffers about the same "drain," but evidence is provided to indicate that some diffusion process within the individual particle itself plays a dominant role in determining the behaviour of a dry cell.

Motor Installation and Maintenance—II

Checking Slip-rings, Brushgear, etc.

By "Rotor"

In the first part of the article (Electrical Review, January 31st) the author dealt with the mechanical aspect, in particular bearings, and now in conclusion deals with electrical tests

SLIP-RINGS should be checked while the motor is running to ensure that they are true and that brush chatter is absent. Metal dust worn from slip-rings or commutator and carbon dust from brushes should be carefully blown away as the creepage path across the insulation is frequently small at these points, and conducting matter may result in carbonization and eventual failure of the insulation.

Brushes should be renewed if the wear is such that there is a risk of the end of the pigtail embedded in the brush rubbing on the slip-rings or commutator or of the brush wearing out of range of the pressure finger. When renewing brushes the correct grade should always be used and the brushes should be bedded to fit closely to the slip-rings or commutator. Final bedding should be carried out by means of a strip of carborundum cloth placed face outwards under the brushes round the slip-rings or commutator and pulled forwards in the direction of rotation. The brushes should be quite free in their holders, the springs in good condition and exerting adequate pressure—about 2 to 2½ lb per sq in. of contact area being a usual figure. The brush pigtails should be firmly connected to the holders, otherwise current may pass through the springs and weaken them.

Blackened slip-rings or commutator may be polished with carborundum cloth, whilst grooves can often be removed by means of a shaped carborundum block. Should the slip-rings or commutator be out of truth they should be skimmed or ground, as little of the metal as possible being removed. Particular attention should be devoted to the inter-segment micas of a commutator. These should be kept clean and free from carbon dust, which sometimes accumulates against the lower brushes and is forced on to the micas, causing carbonization and eventual short-circuiting which may melt the solder from the commutator connections or cause armature coils to burn out. In general the inter-segment micas should be recessed about $\frac{1}{32}$ in. below the surface of a commutator to ensure good brush contact; undercutting must be carried out for the full thickness of the micas. The mica should show a clean white surface when scraped; burnt mica should be scraped out and the resulting hole filled in with commutator cement.

Sparking which appears as a ring round the commutator is often due to dirty or carbonized micas, while severe sparking at all brushes often indicates an open circuit in the armature, possibly due to solder melted from commutator connections. An open circuit is usually revealed by indications of the burning of adjacent commutator segments at the position of the faulty coil.

The slip-ring short-circuiting gear should be examined to see that the contacts are in good condition and properly adjusted. Faulty contact has caused electrical and magnetic unbalance of the rotor to such an extent that the rotor has been deflected and rubbed on the stator. The "click" denoting positive operation of the centrifugal starting device fitted on many single-phase motors should be listened for. If it is absent and the starting is not altogether satisfactory, it may be advisable to dismantle the machine for investigation, as sticking gear has resulted in burning out of the windings.

The temperature of the motor should be checked by hand or, if considered necessary, by thermometer. If the air expelled from a motor occurs as a strong hot blast, overload or an electrical fault should be looked for. A hot feeble air current may indicate restricted ventilation, perhaps due to dirt or other foreign matter on the ventilating screens in the motor case, on the windings or in the ducts through the cores. These parts should be kept clean. Overheating may also result from the air-inlet pipe to a pipe-ventilated motor being too long, too thin, having sharp bends or requiring cleaning. All motors may tend to overheat if the air heated by them cannot escape freely, as when they are installed in confined spaces or in air pockets near roofs.

If overloading is suspected, the motor current should be measured in each phase and compared with the full-load current shown on the nameplate. Increased current will be taken to develop the normal rated horse-power if the terminal voltage is low. Low motor voltage may be due to excessive voltage drop on cables feeding the machine, that are too small having regard to their length.

Overload may result from the choking of the air gap between rotor and stator with dirt or from wear of the bearings so that the rotor rubs on the stator. It may also be due to tight belts, lack of alignment, faulty countershaft, worn, strained or badly adjusted driven plant, blunt cutting tools or use of driven plant at higher speeds or on heavier duty than originally intended. Overheating may also be caused when a short-time-rated motor is run for long periods. Many causes of overload are difficult to detect and for this reason it is wise to protect each motor by reliable overload trips which will operate on a sustained overload of 25 per cent above normal rating.

Other causes of overheating are short-circuited armature or stator coils; and single-phasing, which may be due to loose or burnt connections, faulty contact or melted fuse. A short-circuited field coil of a d.c. motor is likely to run cooler than the sound coils. Overheating may result from wrong connections such as a delta-wound motor being connected in star or a single-phase motor being connected with windings in series instead of in parallel on a certain voltage.

Noisy running sometimes accompanies single-phasing (often indicated by groaning or labouring), loose rotor core or pulley,

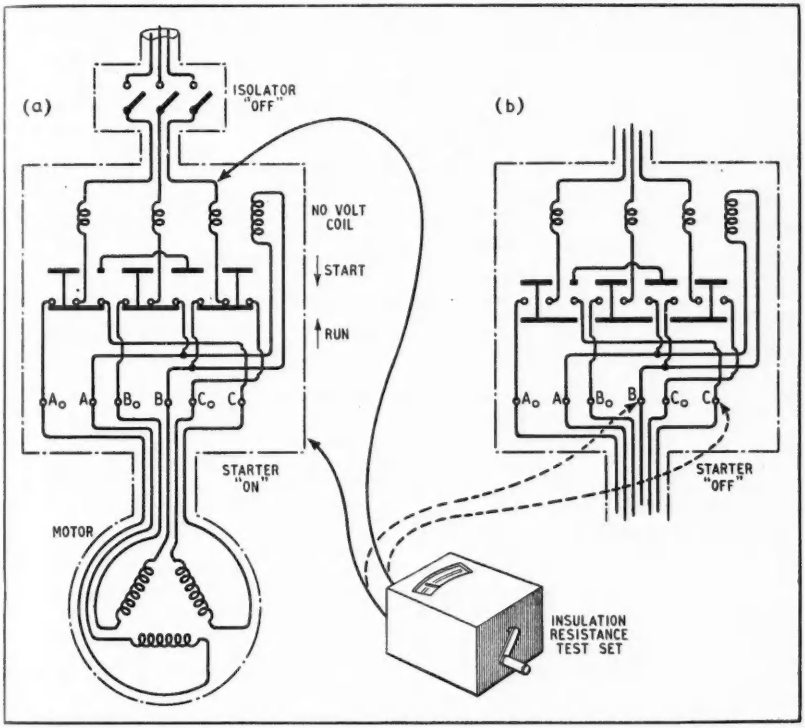


Fig. 4.—(a) Connections for insulation resistance-to-earth test on three-phase motor circuit. (b) Connections for testing insulation resistance between phases on star-delta starter

loose fan or rivets or loose conductors on a squirrel-cage rotor. The last trouble can often be cured by bending the conductors slightly at the ends of the core or by spots of welding. Gear drives should be examined to ensure that the wheels are in good condition and correctly meshed.

As many parts of a motor circuit are not accessible for inspection a periodical test of the insulation should be made by means of an insulation-test set. One test should be made between conductors and earthed casing with the starter isolated and held closed (Fig. 4 (a)). If convenient a test should also be made between phases of a star-delta circuit the starter being "off" for this test (Fig. 4 (b)). The no-volt coil often connects two phases together (A and B), so that for a complete test this circuit should be interrupted by opening the auxiliary overload-trip contacts or "off" push button, if fitted, or by disconnecting the coil at one side. A test should also be made on any separate circuits, such as the rotor circuit of a slip-ring motor or the auxiliary windings of a three-phase commutator motor.

Low Insulation Resistance

Test results may vary considerably, depending on the motor temperature and atmospheric conditions. In general a consistently low insulation resistance usually indicates a less serious state of affairs than a test result which falls at each consecutive inspection. The writer suggests that, for 200 to 500-V motors, further investigation should be made if a test on a motor circuit shows less than 0·5 megohm. This may involve disconnecting various sections, such as cables and slip-rings for individual tests. When the section responsible for the low result has been located, careful inspection will often reveal some easily remedied defect which might have resulted in breakdown later. An unsteady reading is often the result of dirt on insulation, this sometimes being shown up by sparking when testing. The full test voltage should not be applied to a part showing a low reading, as this might cause failure of the weak point.

If the cause of low insulation resistance cannot be found without stripping the windings, a course which is seldom justified, the weak motor might be operated on some non-essential drive. Where all sections of a circuit show a low reading the cause will often be moisture, possibly due to the motor standing unused in a damp atmosphere. Such a motor should be kept warm on site, run periodically or removed to a drier place for storage. It should not be overlooked that some points of certain motor circuits, such as the star point of some rotor starters, may be permanently connected to earth.

Whenever a machine has to be dismantled the opportunity should be taken to clean it thoroughly, including the bearing oil gutters and drains. Thick grease can often be removed from windings by means of petrol thinly applied and removed before it has chance to soak in. The winding can afterwards be varnished.

Imports into Ceylon

CEYLON'S imports of electrical goods in 1945 were small in value compared with 1939 and must therefore have been smaller still in quantity seeing that prices rose appreciably during the war. From the accompanying table, extracted from the official returns issued in Colombo, it will be seen that the only notable advances were in rubber insulated wires and cables and radio goods. (Rupee = 1s. 6d.).

Class of Goods	1945 Rs. (000)	Inc. or dec. on 1939 Rs. (000)
Control and switchgear ..	177*	+ 19
Radio instruments and apparatus	377	+ 70
From United Kingdom ..	306	+ 144
,, United States ..	68	− 1
Other telegraph and telephone instruments	183	− 270
From United Kingdom ..	177	− 273
,, United States ..	6	+ 3
Lighting accessories, fittings, and switches	109*	− 75
Batteries, dry, radio	1*	− 11
Batteries, dry, other	68	− 397
From United Kingdom ..	12	—
,, United States ..	2	− 161
,, India	54	+ 41
Other batteries and accumulators	77	+ 30
From United Kingdom ..	73	+ 44
,, South Africa	3	+ 3
Electrical goods and apparatus not elsewhere specified ..	331	− 55
From United Kingdom ..	304	− 4
,, United States ..	24	− 3
,, India	3	+ 3
Transformers and convertors ..	124	+ 16
From United Kingdom ..	121	+ 16
,, United States ..	3	—
Generators and alternators ..	57*	− 70
Motors	30	− 38
From United Kingdom ..	28	− 35
,, India	1	+ 1
Electrical machinery not elsewhere specified	167	− 157
From United Kingdom ..	127	− 163
,, United States ..	36	+ 32
,, India	4	+ 4
Rubber-insulated wires and cables	248	+ 114
From United Kingdom ..	240	+ 127
,, Hong Kong	8	+ 8
Other electric wires and cables ..	92	− 176
From United Kingdom ..	89	− 74
,, India	2	+ 2
Lamps, gasfilled	186*	+ 102
Electric lamps, other	128*	+ 65
Torch bulbs	1	− 57
From United States ..	1	− 1

* Mainly from United Kingdom

Industry and the House

Planning and "Bottlenecks"

By F. J. Erroll, *M.A., A.M.I.E.E., M.P.*

SO now we have a super-planner. No one probably will envy Sir Edwin Plowden his task and everybody will wish him well. The electrical industries particularly, which have suffered so badly through lack of long-sightedness by the Government and of co-ordination between its departments, hope that all possible success will attend the efforts of Sir Edwin, of Sir Robert Sinclair his industrial consultant, and of their staffs.

The appointment in itself of course achieves nothing, except to demonstrate the good intentions of the Government, which I suppose have never been in question. The wonder is that only after a year and a half of power has Mr. Attlee's administration of self-styled planners realized the need "to develop the long-term plan for the use of the country's manpower and resources" and "to keep in touch with all departments so as to correlate their action under the plan."

A Belated Move

That the Chief Planning Officer and Inter-Departmental Planning Staff are now to address themselves to these tasks is almost an admission that for eighteen months the tasks have been largely left to look after themselves—a thing that would never be allowed to happen in private enterprise industry. It is, I believe, a wise move that Mr. Attlee is now recruiting more of his planners from the industrial field. The method worked extremely well during the war, and Sir Edwin Plowden did particularly useful work at the Ministry of Aircraft Production. I have spoken since to several leading executives of aircraft and light metal firms who have had nothing but praise for his work as chief executive officer of that Ministry.

He will certainly need to draw to the full on his experience of Government planning and co-ordination and on the goodwill and co-operation of industry. For the tasks are enormous, and as a Labour Member remarked to me the other day "There seems to be nothing less than a queue of bottle necks, each pressing hard on the heels of the one in front." Nowhere perhaps is this unhappy state of things better demonstrated than in respect of electricity generation, the subject of a recent statement by Mr. Arthur Greenwood in the Commons.

Mr. Greenwood was replying on behalf of the Prime Minister to questions by Sir Stafford Cripps' ex-lieutenant at the Board of Trade, Mr. Ellis Smith, who asked for a statement on the recent meeting with representatives of firms manufacturing power plant and equipment. When was it expected that the commissioning of new turbo sets would take place, and was "super-priority" now being given to all that was required to produce increased electric power as soon as possible?

Ways and means of increasing and accelerating output of generating plant had been discussed with the manufacturers, said the Lord Privy Seal. They had given assurances of their fullest co-operation. The suggestions discussed at the meeting would be considered by a committee under the chairmanship of The Minister of Supply, on which the Departments concerned, the two Electricity Boards and the industry would be represented. A special organization built on wartime experience was being set up to assist in planning production and in overcoming difficulties. Every endeavour would be made to ensure the necessary supplies of labour and materials.

Closing the Gap

All very commendable—but why only now? The most rudimentary forecasting machinery could have warned the Government many months ago of the approaching crisis and these measures should have been taken then. Mr. Shinwell has admitted, again in answer to Mr. Ellis Smith, that the increase in electricity sold in 1945-46 as compared with 1938-39 was 50 per cent; and that the gap between available generating capacity and maximum demand for electric power was approximately 2,000,000 kW. The gap, he said, would not be closed before 1951. The installed capacity of generating plant planned to come into use in 1946 was 990,000 kW, but the capacity actually brought into commission in that year, including plant planned for earlier years, was 305,000 kW.

It seems now a matter of too little and too

late. Away from the formalities of the Chamber current gossip often centres round the thought that "we are at the limit all the way round." The chief bottleneck, for example, is in factory space and machinery with which to make the generating plant. But when that bottleneck is opened out we shall be faced with the next one—labour. There are not sufficient skilled men. And if we get them there would still be the materials bottleneck—copper and "electrical sheet"—and so on. As a result, one firm making boiler drums is accepting orders for delivery in 1950-51.

Severn Barrage Again

Incidentally, the Severn Barrage scheme is again in the news—another question by Mr. Ellis Smith, asking the Minister of Fuel to call together at once the competent authorities and the civil engineers with an instruction to start work on it as soon as possible. Declining to do so, Mr. Shinwell reiterated his February answer that a tidal model was being prepared, and that this was a necessary preliminary to further consideration of the scheme.

One of the most difficult problems awaiting solution is to fit in the provision of new generating and supply plant with other urgent reconstruction work—one of the matters no doubt to come within the scope of the new planning machine. One example was the question raised by Mr. H. M. Medland, a Plymouth Member, who played a big part in fostering and framing the reconstruction plan for that city. Mr. Medland wanted to know whether the construction of a new power station and the erection of new plant would entail the withdrawal of men from housing and business premises in the area. For the Minister of Works, Mr. E. F. M. Durbin said the new station was included in the agreed programme of non-housing work and should not therefore be detrimental to the housing part of the programme.

Effect of Railway Electrification

There is also concern that developing uses of electricity should not be carried so far as to embarrass the overall capacity. An example of this was the question by Mr. A. J. Champion to the Minister of Transport asking whether he had considered the effect of the further electrification of parts of the Southern Railway in the light of the shortage of generating equipment. Could a statement be made as to the Government's policy on the immediate and long-term programmes of electrification of the railways generally? On the specific question Mr. Barnes said he had the Southern Railway's proposals under consideration and the point raised would be borne in mind. On the general issue he affirmed that the present time was premature for a statement. This is an issue, I believe, which is likely to come up again.

Turning to another aspect of long-term policy there has been a handful of questions on the subject of research. Mr. Robert Boothby has urged the setting up of a scientific and technical sub-committee of the joint planning staff, as an integral part of the planning machinery, to carry out research on lines similar to those adopted by the Joint Technical Warfare Committee. Agreeing that such research was of the highest importance to productivity and industrial efficiency, the Prime Minister pointed out there were existing agencies for studying them, and he doubted the advisability of setting up the suggested sub-committee. There was already the Scientific Advisory Council under Sir Henry Tizard and also the Department of Scientific and Industrial Research. In answer to Mr. Blackburn, he agreed that the activities of these two research bodies should be linked with those of the proposed Joint Production Staff.

Post Office Research

The Assistant Postmaster-General was asked to publish a full record of the results achieved by the research department of the Post Office during the last ten years. In reply, Mr. Burke drew attention to technical publications, such as those of the Institute of Post Office Electrical Engineers, and said it was not considered desirable at present to publish a full record of past achievements. However, an illustrated booklet describing the current work of the research department was being prepared.

Finally, the echo of a long-standing controversy. Sir Stanley Reed wanted to know what scientific estimate had been made of the respective merits of gas and electricity for cooking. Cautiously Mr. Shinwell replied that no precise estimate had been made, and in any event such an inquiry would be complicated both by the wide variations in methods of using cooking appliances and by the different efficiencies with which gas and electricity were obtained from coal.

PARLIAMENTARY NEWS

By Our Special Reporter

THERE was a further debate in the House of Commons last week on the coal and power situation. It was opened by Mr. Anthony Eden, who agreed with the F.B.I. and the T.U.C. that the Government's coal target of 200 million tons this year was too low. In particular the aim to accumulate 10 million tons for stock to build up to 15 million tons before next winter was inadequate. It appeared that three-quarters of the gap between production and consumption would have to be filled by depriving industry of coal, which was a very serious matter. He asked what was to happen after May 1st when the five-day week for miners was introduced.

The restrictions on domestic consumers of gas and electricity added further to the immense burdens carried by the housewife. He asked the Government whether there had been any consultation with the electricity supply industry in the matter of rationing and what was being done about gas. A rationing scheme, to save four days' coal output at the most, would involve a vast staff and a grave new burden on the housewife. He believed that the best way of tackling the problem during the summer months was by the voluntary method of appeal and by giving the public all the facts.

After a reference to the need for attention to coal quality to get maximum efficiency from generating plant, Mr. Eden referred to the need for speeding up the production of such plant and he also questioned the wisdom of exporting power plant and mining equipment.

In the course of his reply, Mr. Shinwell, Minister of Fuel and Power, said that the Government did not intend to permit the export of more mining equipment this year except for exports which were on order or were necessary to secure essential imports. The question of "staggering" the industrial load was in the hands of the Minister of Labour. As regarded coal quality, before the war the number of washeries was inadequate and some of them now required reconditioning. It was impracticable to fix prices according to quality.

The matter of power station plant had been discussed with the Central Electricity Board, the Electricity Commissioners and manufacturers. They had promised co-operation in order to assure the speeding-up of production and the matter was now being dealt with by the Heavy Electrical Plant Committee.

Mr. Shinwell said that the demand for a five-day week from the miners had to be met. A refusal would have an adverse effect on production on a six-day basis. He considered that the arrangements made were satisfactory. If the conditions were adhered to the coal would be obtained, but if men did not turn up for work, thus losing the extra day's pay arranged for, output would be correspondingly reduced.

Dealing with the question of restrictions, Mr. Shinwell agreed that if it were possible no additional burden should be placed upon the domestic consumer. They had considered several rationing schemes but in no case had they found a solution of the many difficulties involved. When electricity and gas were laid on it was very difficult to impose a check. A ration based on previous consumption would not be fair; those who had been extravagant would benefit. This would be avoided by rationing according to size of the household but that might involve dealing individually with 11 million consumers. A combination of the two methods and a fourth scheme of graduated prices had been considered but were thought to be undesirable.

This did not mean that a compulsory rationing scheme would be entirely impracticable; but it would impose hardships and place an intolerable burden on the local fuel overseers. The Government was therefore considering an alternative plan in the hope that the saving would be sufficient to make a compulsory rationing scheme unnecessary and discussions were going on with representatives of the gas and electricity industries. It was hoped to announce the scheme after the Easter recess. In the meantime the existing restrictions on the use of electricity would continue.

An Oxford Complaint

Mr. Hogg asked the Minister of Health whether he was aware of the complaints from Oxford residents protesting against the smoke, fumes and grit from the chimneys of the Oxford electricity works; whether he would make a statement; and what steps he proposed to take in consultation with other Ministries.

Mr. A. Bevan said that he was in touch with the Electricity Commissioners and the Minister of Fuel and Power. The trouble was due to overloading of boilers, lack of the most suitable grades of coal and an insufficiently high chimney. Every effort would be made to see whether any improvements were possible, but it was unlikely that more than limited improvements would be practicable at the present time.

Mining Machinery Exports

Mr. Geoffrey Cooper asked the President of the Board of Trade what was the value of mining machinery exported during the year 1946; what were the delivery dates to be relied upon by the collieries for the delivery of heavy electric motors required for conveyors and

similar machinery; what was the number and value of such motors exported during 1946; what delivery could be relied upon for conveyor belts and cables; and what quantities and values of these were exported during 1946 which were suitable for coal or other types of mining.

Mr. H. Wilson said that the value of mining machinery exported during 1946 was £2,300,000. No separate particulars were available of the exports of electric motors suitable for conveyors and similar machinery used by collieries. Similarly, exports of conveyor belting and cables were not separately distinguished in the trade accounts, but he was informed by the Minister of Fuel and Power that 231,000 ft of conveyor belting, valued at approximately £170,000, were exported during the year.

Electrical Accessories

Viscount Corvedale asked the Minister of Works why electrical accessories were available in chain stores and yet could not be supplied for Scottish housing schemes.

Mr. Key said that many of the accessories on sale in retail shops were below the standards approved for the housing programme. Arrangements had been made for the supply of electrical accessories for priority work through normal trade channels and if Viscount Corvedale would let him have details of any particular difficulties in Scotland, he would be glad to inquire into them.

Motor Components for Germany

Mr. J. Hynd, Chancellor of the Duchy of Lancaster, told Mr. Erroll that no raw materials or semi-manufactured components for the manufacture of electric motors had been imported into Germany from this country during the last 12 months.

Street Lighting

Mr. G. Strauss told Mr. Hicks that the Minister of Transport was not able at present to say when the restrictions on street lighting could be discontinued, but hoped shortly to be in a position to give further guidance to lighting authorities on this matter.

Welsh Water Power

Mr. Peter Freeman asked the Minister of Fuel and Power whether the potential energy obtainable from water supply in the Welsh hills had been considered; and whether he would further investigate this source. Mr. Gaitskell said that the answer to both parts of the question was " Yes."

Electricity Bill

Attitude of Local Authorities

BEFORE Parliament rose for the Easter Recess, Standing Committee E of the House of Commons, which is considering the Electricity Bill, discussed the transfer of electricity undertakings to the State.

The discussion arose on Clause 14, and Mr. Walter Elliot said that local authorities had strong views on the matter. The City of Glasgow suggested that the compensation of £2,340,000 which it was proposed should be paid for its undertaking, should, in fact, be £12,400,000. The electricity undertakings of other great cities such as Birmingham and Leeds were enormous.

Mr. Shinwell, Minister of Fuel and Power, said it was very gratifying that with very few exceptions, the local authorities had accepted the principle of the transfer of their electricity undertakings to the State without compensation. They had been concerned about the matter of compensation for severance and other items, and on those matters he would venture to address the Committee at a later stage on the appropriate clause. The local authorities were, of course, losing very valuable assets, and they had shown remarkable enterprise in building up those assets. But it had been decided that it was better for the purposes of effective co-ordination and such reorganization as was required in the industry, as well as for the purposes of electricity supply expansion, that the scheme embodied in the Bill should be substituted for the existing dispensation. That had been generally accepted. No doubt many of the local authorities felt that they were so efficient in their electricity enterprise as to require no interference, but the matter had been argued very fully.

The Ministry had met the I.M.E.A. and the Association of Municipal Corporations. They were the two principal bodies associated with the local authorities and electricity undertakings. On no occasion, to the best of his recollection, had they expressed any dissatisfaction with the proposal to nationalize the electricity industry of this country.

Col. Clarke declared that by no means all local authorities were satisfied with the Government proposal, especially those who had run their financial affairs on a careful basis.

Mr. R. S. Hudson said he wished it to be put on record that the Conservative party did not agree that this " robbery of local authorities' assets by the State " had received general approbation.

The Clause was carried by 18 votes to 11.

Mr. Boyd-Carpenter moved to omit the proviso that agreements of employment should

not be referred to arbitration without the consent of the Minister. The Minister's veto on an individual's right to appeal was unlimited and final.

Mr. Palmer agreed that there was a certain amount of concern among engineers and others in the electricity supply industry in the matter. He asked the Minister to look into the question again to see if the bar on agreements relating to personal services going to arbitration could be removed.

Mr. Gaitskell, Parliamentary Secretary to the Ministry of Fuel and Power, promised to look into the question whether there was a danger that employers would make agreements with senior employees for long-term salaries. It was not likely to happen on a large scale, but it might happen in a few instances.

The amendment was withdrawn.

Electricity Boards' Stocks

On Clause 17, Mr. Birch moved an amendment of the clause dealing with compensation to holders of securities of bodies other than local authorities, which sought to have the stocks of existing joint electricity boards treated in the same way as securities guaranteed by the Government. Although these securities were not trustee stocks they were regarded as secured stocks, and a mass of them were held by trustees. He thought it rather sharp practice that they should be wiped out, and believed that it would seriously prejudice the credit of all public corporations set up by Parliament.

Mr. W. G. Hall, Financial Secretary to the Treasury said that Mr. Birch's argument seemed to be that when the public subscribed to these securities they were under the impression that they were in some way semi-gilt-edged. Because of that Mr. Birch held that the securities of the Central Electricity Board and the joint electricity authorities should receive the same treatment as that which the Government proposed to give, for example, to certain classes of London Passenger Transport Board stock.

Mr. Birch.—And the North Metropolitan Electric stock.

Mr. Hall said he was using the London Passenger Transport Board as an example because it covered two or three other types of stock which were in the same category and class. There was no analogy between those public boards' securities, and the guarantee which was given to certain classes of London Passenger Transport Board stock. If, as it very well might have been said, the people who invested in the stock of the Central Electricity Board or the joint electricity authority undertakings, felt that they were investing in a special type of security, that would undoubtedly reflect itself in the Stock Exchange prices.

Wherefore when they took, as they were taking, the market value of those stocks and securities on certain dates, quite obviously they were doing what was fair and reasonable, because if the securities were considered to be gilt-edged, that fact was reflected in the prices at which they were quoted and which a willing seller was willing to take from a willing buyer.

Sir Arnold Gridley said he had seldom heard weaker arguments. He remembered each of the issues of the Central Electricity Board being made, and people subscribed to them in full confidence that they would receive revenue from their investments because the Central Electricity Board rested on the absolute assurance that its income was perfectly safe. The amendment was negatived by 21 votes to 13.

Col. Crosthwaite-Eyre moved an amendment to provide for the payment of compensation to the electricity companies instead of to the ordinary shareholders.

Mr. Hall said that he saw no reason why companies should act as " post offices " between the Central Electricity Authority and the stockholders. Nationalization would kill the companies and the proper thing was to bury their dead bodies as quickly as possible.

Mr. R. S. Hudson said that in the case of coal and electricity the State was taking over certain physical assets. In those cases companies existed which owned those assets. In the one case the State had paid the companies and in the other proposed to pay off the shareholders. Why should the Government make the distinction? The amendment was negatived by 17 votes to 12.

An amendment to insert four new sub-sections providing for independent arbitration on the value of the undertakings to be taken over by the State was under consideration when the Committee adjourned until April 16th.

Indian-Canadian Trade

DISCUSSING the capability of Canada to provide plant for Indian industries, the Indian Trade Commissioner in Toronto, reported in the *Indian Trade Bulletin*, says that while there is no Canadian company which can undertake the complete overall engineering, fabrication, purchasing, construction, erection and operation of plants, one or more organizations could be formed to take care of any project. Among the types of equipment said to be available from Canada are Diesel, hydro and steam electric power plants and most types of boilers. In most cases, the Commissioner says, prices compare favourably with those obtaining in the United Kingdom or United States.

On the question of prospects of Canadian co-operation in establishing plants in India, the Commissioner refers to three interested classes of Canadian industrialists, viz., those who will not supply designs, processes and personnel unless they can retain control of such plants; those who would contribute some capital to assist in setting up plants; and those who are interested in assisting India by contributing designs, processes and operating personnel.

Housing Supplies

Details of Schemes for New Estates at Bradford

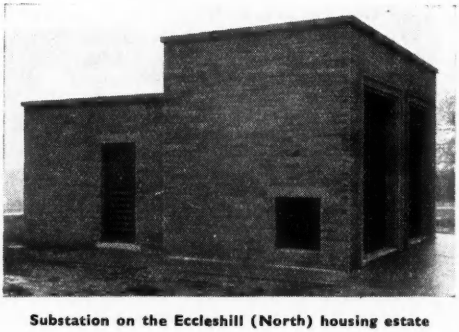
PARTICULARS of schemes for supplying electricity to four of the Bradford Corporation's new housing estates at Eccleshill (two), Clayton and Buttershaw have been sent to us by Mr. T. H. Carr, the city's electrical engineer and manager. While all the houses are to have electric lighting, half are being provided with gas appliances and half with electrical. Living rooms have open fireplaces with back boilers, small gas appliances or electric immersion heaters being installed for summer use. In houses for people with very low incomes, cooking is by solid fuel, with gas rings or electric boiling points. Electric points are being fitted for radio, vacuum cleaner and iron in all houses. Cookers, wash boilers and refrigerators, where provided, remain the property of the Corporation. The Corporation, therefore, provides most of the electrical apparatus as a normal part of the amenities of the house, and accepts the responsibility for installation and maintenance, the use of the appliances being paid for in the rent.

A demand of 1 kW per domestic consumer has been assumed to be a reasonable average figure for normal conditions. The substations provisionally sited by the city architect have served as the starting point in the planning of the network. The roads were completed before erection of the houses was commenced, and cables are laid in the verges and footpaths direct in the ground except at road-crossings where self-locking earthenware pipes are used. The estates are situated from 2 to 4 miles from the power station, and the estimated fault condition at any point of supply does not exceed 100 MVA.

The substation buildings accommodate two transformers, and 6·6-kV and 400-V switch- and fuse-gear. Where substations are located on the housing estates, the transformers are indoors. Local sandstone, 12 in. thick, hammer dressed, has been used for the main exterior walls of most of the substations. The architraves, coping, steps and lintels are of artificial stone. The roofs are of 6-in. reinforced concrete, covered with asphalt. The floors are also of concrete.

The initial installation of each substation consists of two 750-kVA transformers, but the building chambers, switchgear and cabling are all capable of ultimately taking 1,500-kVA transformers. Whenever possible existing h.v. feeders provide a ring main supply to each substation. The h.v. switchgear is of the single-busbar 6·6-kV, 150-MVA oil-immersed type, and the medium-voltage fusegear is of the 25-MVA h.r.c. type. One transformer only is normally in circuit, but the medium-voltage fuse-gear can be sectionalized so that each transformer serves one-half of the outgoing distributors. Auxiliary equipment installed in each substation includes a 30-V switchgear tripping battery and a private system telephone.

The pipes and the whole of the feeder and distributor cables were provided by the Electricity Department, but trench work and the pulling in of the cables were carried out, under the supervision of the Electricity Department, by the roadwork contractor.



Substation on the Eccleshill (North) housing estate

With the ever-changing charges for labour and materials, it is difficult to give firm costs but the total estimated cost to the Electricity Department for the four estates is £66,185 for 1,977 houses, an average of £33 12s. per house. The estimated average cost per house service, which includes the provision of service cable, meter and house service unit is £16 15s. The house service components—intake chamber, main switch and distribution board costs, approximately £4 12s., are charged to the contractor. Loop services may be provided thereby saving a tee joint and some cable. The only charge to the Housing Committee is for services over 30 ft in length, at 11s. per yard.

The Street Lighting Sub-Committee has adopted sodium lighting for three of the estates, the streets of which are classified as Group "B." The estimated cost per lighting point is £27. The mounting height of the lantern is 15 ft with an average spacing of 120 ft. The average output per 100 ft linear of road with 60-W sodium lamp is 2,210 lumens. Control will be effected by means of the "Rythmatic" system operated from the Valley power station.

COMMERCE and INDUSTRY

I.M.E.A. Convention Programme. "Priorities" for Steel.

A PRELIMINARY programme for the Bournemouth Convention of the Incorporated Municipal Electrical Association has now been issued. Details are as follows:—

Monday, June 23rd.—Issue of badges at the Pavilion; reception by the president (Mr. J. S. Pickles). *Tuesday, June 24th.*—Civic welcome by the Mayor of Bournemouth and presidential address; paper by Mr. F. W. Lawton on "Recent Developments in Power Station Practice"; ladies' tea, to meet Mrs. Pickles; reception by the Mayor and Mayoress of Bournemouth. *Wednesday, 25th.*—Whole-day trips round the Isle of Wight and to Cheddar; half-day trips to Swanage and the New Forest. *Thursday, June 26th.*—Paper by Mr. R. Birt on "The Law Relating to Electricity Supply"; banquet and ball. *Friday, June 27th.*—Ordinary general meeting.

As already reported, there will be an exhibition and the full programme will be circulated next month.

Wages in the Contracting Industry

Workers in the electrical contracting industry are endeavouring to reopen pay increase negotiations which broke down in December last. An official of the Electrical Trades Union stated last week that a deputation of shop stewards was calling at the employers' association's London offices and would later visit the Ministry of Labour and the House of Commons to interview M.P.'s. Attention is being drawn to claims for increases in rates of pay, a new wage structure, pay for statutory holidays and a guaranteed working week. Men affected are employed mainly in the building industry.

Supply Workers' Holidays

The National Joint Industrial Council for the Electricity Supply Industry, at a meeting on March 27th, agreed upon revised clauses to replace the existing Clauses 3, 4 and 5 of the national holiday agreement. Representations had been made by a number of District Councils regarding anomalies in the operation of the agreement. The revisions took effect as from the date of the meeting.

Space-heating Code

A further addition to the electrical installations series of Codes of Practice is CP—3·6421, which is concerned with domestic space heating. It is a guide to the provision of independent appliances in single family dwellings as distinct from central heating systems. The design of installations, exclusive of wiring, as well as the computation of heat requirements and losses, the classification of heaters of various kinds and their different characteristics are all dealt with in detail while certain safety precautions are recommended. Copies of this Code (circulated for comment up to May 14th) are obtainable for 2s. (ref. CP(B)644) from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Steel for Power Plant

Electricity generating plant is first in a list of "priorities" in the allocation of steel announced last week by the Press Association and confirmed by the Ministry of Supply. The next in order are mining machinery and equipment; coal-oil conversion equipment; freight locomotives, wagons and steel rails; and material for the development of atomic energy.

Austrian Industrial Mission

Visits to industrial machinery and machine tool producing plants will be made by the Austrian Industrial Mission which arrives in this country on April 14th and is expected to stay about a week. The British Engineers' Association is collaborating in arrangements affecting the engineering industry. The object of the Mission is to conduct investigations to see how trade relationships between the United Kingdom and Austria can be extended, and plans are being made for visits to a wide range of plants in this country. The Mission includes Director Ing. Siegert of the Elin A.G., member of the Production Board of the Austrian Electrical Organisation.

Tenders for Shares

In our issue of March 14th we reported that the Board of Trade was inviting tenders by April 15th for the purchase of shares in certain companies held by the Custodian of Enemy Property. The Board of Trade now announces that the due date for tenders has been altered to April 29th.

Research and the Smaller Firm

In October last a conference on the above subject was organized by the Manchester Joint Research Council. The papers and discussions are now available from the Council (Chamber of Commerce, Ship Canal House, King Street, Manchester, 2) in a 102-page booklet, price 2s. 6d. plus postage.

Paris Fair

The thirty-sixth Paris Trade Fair to be held from May 10th to 26th will be increased in area this year by 25 acres, bringing the total area available to 125 acres. It is expected that with improved travel facilities the number of

visitors will be larger than last year, when more than a million and a quarter people attended the Fair. It is also expected that last year's total of 120 British exhibitors will be increased. Practically all the British firms who exhibited then have renewed their stand bookings. A special feature this year will be the separate exhibition of radio, musical instruments, cinema and television apparatus at the Grand Palais (Champs Elysées).

Employment in the Electrical Industry

Further expansion of employment in the principal branches of the electrical industry in Great Britain during 1946 is indicated in statistics published in the February *Ministry of Labour Gazette* which are reproduced in the accompanying table. The increase was most marked in apparatus, cable and lamp manufacture in which the total at the end of the year represented an increase of 36 per cent over the mid-1939 level, largely on account of the greater number of women and girls employed (an increase of 67 per cent).

A rise of 19 per cent in the number engaged in the electrical engineering industry was almost wholly attributable to an increase of 88 per cent in the number of females employed. In the electrical wiring and contracting industry the increase amounted to 31 per cent; here again, there was a rise in the number of women, although the proportion was much smaller than in the case of the other two branches.

Employment During December, 1946 (Thousands)

Branch	Males (14-65)			Females (14-60)			Total		
	Mid-1939	Mid-1946	Dec., 1946	Mid-1939	Mid-1946	Dec., 1946	Mid-1939	Mid-1946	Dec., 1946
Electrical engineering ..	105·9	99·9	106·4	28·0	53·2	52·7	133·9	153·1	159·1
Electrical wiring and contracting	38·9	45·5	49·5	2·8	5·4	5·3	41·7	50·9	54·8
Electrical apparatus, cables, lamps, etc.	116·4	117·4	134·4	79·5	126·8	132·4	195·9	244·2	266·8

Unemployment totals in the three branches at January 13th last were as follows: Electrical engineering, 2,411 (636 females); electrical wiring and contracting, 1,244 (64 females); and electrical apparatus, cable, lamps, etc., 3,335 (1,378 females).

Church Fluorescent Lighting

In the description of the new fluorescent lighting installation in St. Paul's Church, Harringay (*Electrical Review*, March 21st, p. 451), it was stated that only 15 per cent of the former wattage (tungsten) was used. This figure, the General Electric Co., Ltd., states, should have been 50 per cent.

Southampton Docks

Those concerned with the maritime trade of this country will find the 1947 edition of "Southampton Dock," a handbook of rates, charges and general information, published by the Southern Railway Co., both useful and interesting. The book contains detailed particulars of the accommodation and equipment at the Docks and includes historical notes on the development of Southampton Water, a pre-war trade review, and the story of wartime activities. It is profusely illustrated.

Reports on German Industry

Further reports on German industry have been published and a few copies are available from H.M. Stationery Office at the prices shown and the reports may be seen at a number of the leading libraries. They include the following:—B.I.O.S. 1097, "German Battery Electric Road Vehicles" (5s.); and F.I.A.T. 894, "Electrostatic High-Voltage Generators (1s. 6d.)

Government Contract Prices

In a letter to his members Mr. L. C. Penwill, director of the Electrical Contractors' Association, says that for some time past there has been an understanding between the Association and the Ministry of Works that in general it is reasonable for fixed prices to be quoted for work costing less than £100, such quotations to be on the basis that if the tender is accepted the work can be put in hand without delay and carried to an early completion. Reports that there was an undue delay between the time of tender and the time of acceptance, or alternatively, between the time of acceptance and the time upon which the contractor received instructions to commence the work, led the Federation of Associations of Specialists and Sub-Contractors, of which the E.C.A. is a member, to take up this matter with the Government Contracts Co-ordination Committee in January, expressing the view that if exceptional circumstances are likely to cause delay the tenderer should be given the opportunity of making his tender subject to a variation clause.

The Contracts Committee has replied that if there is delay between submission of a tender and the time when a Department is ready to accept the selected firms are asked to confirm that their price remains unaltered. If this precaution is not taken and an unreasonable period is allowed to elapse they might have difficulty in holding the tenderer to the original price quoted if he challenged the acceptance.

It is the usual practice when work cannot

proceed at once to indicate the approximate date when it is anticipated that the building operations will be in a fit state for the specialist work to proceed. Then if the tenderer fears that there may be labour increases between the date of acceptance and date of starting work on site which he is not prepared to carry in his price it is open to him to ask for the operation of a wages variation clause.

Unreliable Water Power

Little support for opinions expressed of late that the development of water-power resources in this country would have avoided electrical shortcomings owing to failure of coal deliveries is to be found in two reports on fuel economy since 1939, published by the Central Office of the World Power Conference, 36, Kingsway, London, W.C.2. One of these relates to France (1s. 6d.), where hydro-electric stations provide more than half the output and droughts are largely responsible for present curtailments of electricity supply. In addition to technical particulars of fuels this report contains much information relating to power stations and the consumption of electricity by different industries. The other publication deals with conditions in Ireland (6d.) where " cuts " as a result of drought are no new feature, but they have become more serious recently owing to the diminished tonnage of imported coal and (as in Britain) its unsuitability and high ash content.

Edinburgh Transport

We have received from the manager of the Edinburgh Transport Department a large-scale map (about 3½ in. to a mile) of the city's extensive transport system with an inset plan of the centre of the city and indications of places of interest. With it is a 168-page handbook giving addresses and terms of hotel, boarding house, etc., accommodation in Edinburgh.

Lighting a Shipbuilding Berth

A system of floodlighting designed by Metrovick illuminating engineers for William Doxford & Sons, Ltd., Sunderland, allows shipbuilding work to proceed until any hour, and in addition the use of portable handlamps with their trailing cables can be confined to fine work and to enclosed areas. The first berth being lighted is 88 ft wide tapering from 90 ft to 110 ft in height at the riverside, and is capable of taking a hull up to 550 ft in length. An intensity of 1·2 lumens per sq ft is possible at keel level and as the hull develops the intensity increases to 3·7 lumens per sq ft on the sides at 20 ft, until a maximum of 6·5 lumens per sq ft is obtained at deck level. The illumination

Metrovick floodlighting for shipbuilding berth

is provided by means of totally enclosed floodlight projectors and parabolic angle reflectors housing high-wattage general service lamps. The scheme consists of seven 500-W floodlights mounted in the centre of the berth at heights sloping from 90 ft to 110 ft; four 500-W floodlights mounted on crane columns on the sides of the berth (in two rows of seven) approximately 76 ft high; and twelve 1,000-W parabolic reflectors mounted in two rows of six, 50 ft high. The lighting load is 22·5 kW. Other berths are to be equipped in a similar manner.

" Ekco " Activities

E. K. Cole, Ltd., announce that as from April 1st the whole of the activities of their Lighting Division, including Ensign Lamps, Ltd., are merged into one company known as Ekco-Ensign Electric Ltd. The company, which is a wholly owned subsidiary of E. K. Cole, Ltd., will manufacture tungsten filament lamps, fluorescent lamps, fittings, control gear and other lighting equipment. Distribution will continue through the existing depots and sales organization. The directors are Messrs. E. K. Cole (chairman); D. W. Pritchard (vice-chairman); J. E. Clark and J. F. Young (joint managing directors); W. V. Green; and J. Corbishley (secretary).

E. K. Cole, Ltd., have just issued an attractive 44-page brochure centred around their war dispersal. The story tells of the pre-war " Ekco " organization at Southend, how the company

went over entirely to the production of war equipment, how the units and personnel were scattered to shadow factories, and of the return to peace. The publication, "How it Changed our Lives," is brightly produced in a striking coloured cover and lavish use is made throughout of photographs and decorative maps.

Trade Announcements

As a first step in extending their activities C. H. Blackburn & Co., Ltd., have just moved into a new factory in Shelburne Road, Calne, Wilts. Since the destruction of the London works by enemy action in 1941 the company has used premises made available by trade friends. All goods, as well as correspondence on technical matters, should in future be sent to the new address, but accounts and matters of policy will continue to be handled by the head office at 10, Gray's Inn Road, London, W.C.1.

Richard Crittall & Co., Ltd., have formed an American subsidiary—Richard Crittall Radiant Heating, Inc., 665, Fifth Ayenue, New York—with a British staff to advise and co-operate in the installation of all types of radiant warming, including the "Medrae" and "Dulrae" electrical systems. A similar service is to be provided in Canada. The company has acquired 154,000 sq ft of floor space and an option on a further 15,000 sq ft at the Rolls-Royce factory at Hillingdon, Glasgow.

The Harland Engineering Co., Ltd., has appointed Mahindra & Mohammed, Ltd., of Bombay and Calcutta, as its agents in India.

Change of Name

Acticarbon, Ltd., 175, Piccadilly, London, W.1, has changed its name to the British Ceca Co., Ltd. The address remains the same. The change has been made to bring the name in the British Empire into line with the world-wide organization of CECA (Carbonisation et Charbons Actifs) of Paris, whose processes are used.

Whitaker's Almanack

The 1947 edition of "Whitaker's Almanack" (published by J. Whitaker & Sons, Ltd., 13, Bedford Square) contains 1,100 pages and is the largest and most informative yet published. A number of pre-war features have been reintroduced, such as legal notes, which have been completely revised, the weather and tables of tides and tidal constants. More information is given with regard to the United Nations and their ancillary agencies, and the Trades Union Congress, the F.B.I., Industrial Research Organizations, and Working Parties are dealt with at greater length. There is also an historical record of the activities of friendly societies. The usual three editions are available: the complete edition, cloth bound, at 12s. 6d. net; shorter edition (omitting pages 705 to 1,100), paper bound, at 7s. 6d. net; and the library edition, containing a special section of up-to-date coloured maps and half bound in leather, at 25s. net.

Scottish Industrial Design Exhibition

The Scottish Committee of the Council of Industrial Design is to hold an Exhibition of Industrial Design called "Enterprise Scotland 1947," in Edinburgh in August and September. It will take place during the Edinburgh Music Festival, and will open on August 25th in the Royal Scottish Museum, with supplementary displays in at least twelve of the shop windows in Princes Street. The Exhibition will not be a trade fair and space will not be sold. The exhibits will be chosen from goods submitted to selection committees appointed by the Scottish Committee.

Lighting Urban Centres

We regret that a key to the second diagram in the article of this title in our issue of March 21st (p. 427) was omitted. It was as follows:—"1. 250-W 'Osram' h.p. mercury vapour; 2. 500-W tungsten; 3. 140-W sodium; 4. Three 80-W fluorescent." In the diagram on page 430, the first two columns were reversed.

Trade Publications

British Thomson-Houston Co., Ltd., Lighting Section, Bridle Path, Watford Junction, Herts.—Bulletin (No. 9) reviewing circuit practice and trends in discharge lamps with diagrams and graphs.

Morecambe Electrical Equipment Co., Ltd., Westgate Works, Morecambe.—Illustrated and priced catalogue (No. 346/2) of direct, star-delta, auto-transformer, series-parallel, stator-rotor starters and magnetic brakes.

Crypton Equipment, Ltd., Bridgwater, Somerset.—Illustrated lists dealing with (A.30) metal rectifier chargers and (A.32) mobile boosters for batteries.

William Geipel, Ltd., 156, Bermondsey Street, London, S.E.1.—Pocket size price list (No. 27,147) of rubber insulated cables and flexibles including tables of useful memoranda.

Arcolectric (Switches), Ltd., Edwin Road, Twickenham, Middx.—Illustrated and priced leaflet (S.550) on miniature toggle switch.

Fry's Metal Foundries, Ltd., Tandem Works, Merton Abbey, London, S.W.19.—Technical leaflet (No. 5) on soft solders of various compositions for service at elevated temperatures.

E.A.W. Branch's 21st Birthday

The Manchester & Salford District Branch of the E.A.W. celebrated its twenty-first birthday on March 27th. The toast of the Branch was given by the Dowager Lady Swaythling, the Association's President, and responded to by Mrs. R. A. S. Thwaites, the Branch chairman. Miss C. Haslett (E.A.W. Director) proposed the toast of "The Cities of Manchester and Sal-

ford," to which responses were made by the Lord Mayor of Manchester, Alderman T. H. Adams, and the Mayor of Salford, Councillor Thomas Clarke. "Future Success" was proposed by Lt. Commander E. J. Cook (E.D.A.), and acknowledgment was made by Mr. W. T. Stephenson, chief inspector of schools, Manchester Education Committee. The toast of "Our Guests" was given by Mr. R. A. S. Thwaites, city electrical engineer, and replied to by his predecessor, Mr. H. C. Lamb. A special electrical exhibition at the Manchester Electricity Showrooms was opened by Miss Haslett in the morning. At a meeting in the afternoon in the Town Hall, at which the Lord Mayor and Lady Mayoress were present, a "birthday" cake was cut.

Fashion Parade at Philips Works

A mannequin parade of spring fashions was held in the canteen at Philips' Mitcham works on March 27th before nearly 1,000 women workers. The show was arranged by Mr. Harry Crossley, entertainments organizer, as a lunch-break entertainment.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from the dates stated:—

March 19th

Design. No. 638,567, Class 9. Electrical apparatus and instruments included in Class 9; coin or counter-freed apparatus; talking machines, thermostats, etc.—H. Fisher (Oldham), Ltd., Star Works, Edge Lane Street, Royton, Lancs.

WORLD WIDE (design). No. B645,307, Class 9. Radio-telephonic, radio-telegraphic and television apparatus, electric irons; vacuum cleaners and parts not included in other classes. —World Wide Distributors, Ltd., 25-27, Oxford Street, London, W.1.

GECOPHONE. No. 645,083, Class 9. Telephonic apparatus and parts thereof not included in other classes.—General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

EDISWAN. No. 645,552, Class 9. Electric batteries, accumulators, rectifying apparatus, vacuum cleaners, induction and control apparatus, gramophone apparatus, thermionic valves, mechanical and illuminated signs and advertisements, and insulated wires and cables for electric transmission. No. 645,553, Class 10. Electro-medical apparatus. No. 645,554, Class 11. Apparatus for lighting, heating, cooking, refrigerating, drying and ventilating purposes; electric lighting fittings and lampshades.—Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.

MINITRAN. No. 645,639, Class 9. Electric chokes and transformers.—R. T. S. Electronics, Ltd., 2-3, King Street, Exeter.

SERVOTRON. No. 645,704, Class 9. Electric discharge tubes and apparatus included in Class 9 incorporating electric discharge tubes.—Ferranti, Ltd., Hollinwood, Lancs.

ENROX. No. 645,946, Class 9. Electric arc and resistance welding apparatus.—English Electric Co., Ltd., Queen's House, 28, Kingsway, London, W.C.2.

March 26th

CAPACITRON. No. 641,791, Class 9. Electrical apparatus included in Class 9.—R. F. Laycock and others, trading as the Capacitron Co., Chicago, U.S.A. Address for service: c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

VISKRAFT. No. 645,408, Class 11. Fittings for and parts of electric lighting, heating, cooking, drying, ventilating, etc., none being included in other classes and all being made of plastics. —Viscose Development Co., Ltd., Woldham Road, Bromley, Kent.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

The Export Department of a London firm of agents has orders to place for 5-A switch-plugs, bakelite plug adaptors, branch adaptors, 10-A H.O. type d.p. cut-outs, 5-A bakelite switches and switch-plates, bakelite lamp-holders, breakfast cookers and electric saucepans. (X.176.)

India.—A firm of engineers, importers, etc., in Bhopal, Central India, are interested in electrical and mechanical equipment and appliances of all kinds, radio apparatus and hardware. (X.177.).

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Makers of centrifugal switches for capacitor start motors (other than motor manufacturers).

NEW BOOKS

Applications of "j" Theory. Specialist Engineering Drawing.

The Vector Operator j. By F. C. Gill, A.M.I.E.E. Pp. 61; figs. 28. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, Kingsway, London, W.C.2. Price 7s. 6d.

It is no overstatement on the jacket that this subject has received scanty treatment in electrical engineering textbooks; a brief introductory chapter is the most they can usually afford. Mathematical books, on the other hand, treat complex algebra as one small section of the whole technique of mathematics; as a result their survey is too compressed and too elaborately developed for the more practical type of engineer.

Accordingly there is great need for the kind of book Mr. Gill has set out to write. His success, however, is an unnecessarily restricted one. The very unmathematically minded or those utterly unaware of the resources of mathematical method will find this just the book they want. The approach is direct, matter-of-fact and meticulously detailed. Having established a formula, he works carefully through many examples, catering for all cases however trivially different. This gives the book rather a repetitive flavour.

The same criticisms apply to the theoretical proofs, which are unimaginatively presented. A sort of mathematical verbosity is here predominant and the ingenuity of the method is partly submerged, the elegance entirely. This is particularly true of his treatment of $e^{j\theta}$ (incidentally it is astonishing in this section to find that $(\cos\theta + j\sin\theta)^{\frac{1}{2}}$ is given one value only, without mention of the other four).

All of this is disappointing. The use of "j" in electrical theory is capable of being presented attractively to all kinds of students. Mr. Gill has missed a nice opportunity; he has aimed too low and has neglected the large mass of unmathematical, yet curious, engineers who might be lured into finding this "j" theory exciting instead of merely tolerable. On the other hand, the numerous exercises after each chapter will ensure that a diligent student has ample practice with all the applications of "j" to ordinary electrical circuits.—F.G.G.A.M.

Plastics for Production. By Paul I. Smith. Pp. xvi + 216; figs. 18. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 15s.

This is a sober study, but the original book was too small to deal with such a large subject. The second revised edition has been enlarged somewhat and increased in price. Its ten chapters, with a short glossary and index, include one chapter of 26 pages on the use of plastics for electrical insulation and in the last chapter there is brief reference to their employment in lighting fittings. It is very difficult to deal with electrical considerations in the space at the author's disposal, but his main object has been to treat of the functional aspects of these substances as materials of construction. His summarization is succinct and practical, though intensely condensed; in praising this group of materials he is careful to point out their limitations. A two-page bibliography has enabled abstruse chemistry and mathematics to be excluded, which makes this treatise more readable to the non-specialist.—W.O.F.

Drafting for Electronics. By L. F. B. Carini. Pp. 211; figs. 186; index. McGraw Hill Publishing Co., Aldwych House, Aldwych, London, W.C.2. Price 12s. 6d.

The number of books dealing with the subject of engineering drawing is legion, but while the science of engineering is divided into many diverse sections, nearly all these textbooks follow along the old familiar lines—couplings, bearings and reciprocating steam engine details. The result is that the specialist teacher, say, in an electrical engineering college despairs of ever finding a book which, while enabling him to teach engineering drawing to his students, will also assist in laying the foundations of the design of electrical machinery.

The book under review is a notable exception to the general rule and, in view of the great importance of what has come to be called the science of electronics, it is one which should be welcomed by both teachers and students in this branch of electrical engineering. The author deals essentially with the production of circuit diagrams for such equipment as radio receivers and transmitters, cathode-ray tubes and the various industrial applications of electronics; although he has a useful chapter on engineering graphics as well as on production of graphs, nomographs and preparation of patent specifications. The subject of the special production of drawings for reproduction is also covered.

It is, however, rather to be regretted that the book is of American origin, not because the circuit for, say, a superheterodyne radio receiver is different there from what it is in this country, but because the nomenclature and symbols are frequently not the same. These handicaps are not of a very serious nature and the book is so clearly written and so profusely illustrated that the British reader should not have any difficulty in following the author's meaning. We might suggest that the early chapters on drawing instruments, sharpening pencils, etc., which are a [illegible] feature of most British textbooks on engineering drawing, could be dispensed with although the section on lettering and the use of stencils represents a new and useful feature.—A.R.

Export Trade Methods

Handling and Forwarding

By John C. Hancock

IN an article in the *Electrical Review* of April 4th, the need was stressed for reducing shipping costs on export business. In the present article the points for and against the employment of a forwarding agent to handle the exporter's traffic are considered.

Two important factors to be borne in mind when making a decision are (i) the situation of the exporter's administrative premises and (ii) whether he has the staff available to undertake the extra work entailed. If the trader is fortunate enough to be situated at or near one of the main United Kingdom ports it is generally possible to dispense with the services of a forwarding agent completely and it is a comparatively simple matter for the exporter to handle his own shipping consignments. Because he has in any event to cope with a certain proportion of the inordinate amount of paper work involved in making a shipment, even when an agent is employed, the additional work, in effect, merely amounts to taking a further step and completing the operation already begun. Being on the spot, so to speak, he is in an excellent position to deal direct with the various shipping companies and brokers, and to attend to other necessary formalities himself more expeditiously.

Limited Facilities

If on the other hand the premises of the exporter are situated away from a port area the same formalities could be completed through the post in the same way as they would in all probability have to be conducted were an agent employed at the port of shipment. Thus, the fact that the exporter may not be strategically situated near a port need not unduly deter him from attending to his own shipments. As already pointed out, even when a forwarding or shipping agent is employed, a considerable amount of paper work needs to be done by the exporter himself, unless he is content to accept without question whatever freight is charged.

This work amounts to providing the agent with a full shipping specification covering the packages forming the consignment. That is to say, the detailing of the contents, weights and measurements of the individual packages is necessary to enable bills of lading and other documents to be prepared. Also, since most agents lack an intimate knowledge of the exporter's wares it is generally necessary to give a description, in accordance with the official import and export list, together with a free-on-board value, which will satisfy H.M. Customs officials. It will be seen then that the employment of a shipping agent merely relieves the exporter of a certain amount of work while at the same time it is as well not to lose sight of the fact that the agent's services are not performed free of charge.

Although agency fees vary considerably a charge is made for each service attended to. In cases where registration of freight is necessary a charge is made when the service is performed by the agent. The preparation of bills of lading and attending to Customs formalities are, *inter alia*, also charged to the account of the exporter, while on top of these items there is the agency fee which is usually calculated at a percentage—varying from 2½ to 10 per cent—of the freight charges paid to the shipping company.

Uses of an Agent

If it is quite impossible for the exporter to attend to his own shipments it is generally more satisfactory to employ the same agent to look after all his shipments than to consign them to the care of a variety of agents or to the agents or brokers of the carrying line. Provided, of course, that the service is efficiently and promptly performed, the advantage of employing the same agent is that this agent will in time acquire a useful knowledge of the type of goods usually dealt in by the exporter and is more likely to become more familiar with the requirements of his principal. A closer knowledge of the exporter's requirements will often enable the agent to deal with unexpected contingencies, which arise from time to time in matters relating to shipping, on his own initiative and without awaiting the receipt of special instructions.

Some forwarding agents specialize in what is known as a groupage service, that is, small

consignments of goods are accepted from several different shippers and included on a collective bill of lading, the freight charged at *pro rata* plus a small agency fee. No bill of lading is issued to the individual consignor but the consignee obtains the goods by means of a delivery order which is issued by the overseas branch or agency of the forwarding company.

For some time groupage services have been in operation between the United Kingdom and the Continent and between the United Kingdom and Canada and the United States. One very useful and important service which is also performed, when requested, by the operator of a groupage service is attending to the collection of the amount due from the consignee.

Another service which the exporter, especially the exporter in a small way of business, can very often use to advantage is that provided by the export packer. Not infrequently, orders for export are received which it is not policy to refuse but which cause more inconvenience than they are actually worth. In these instances it very often pays the trader to leave the packing and despatching of such orders to an export packer.

From the foregoing it will be seen that a great deal depends on the facilities at the disposal of the exporter whether he handles his own shipping traffic or not. After all is said and done, the business of shipping goods abroad consists largely of form-filling—such as applying for freight space on an approved form and preparing bills of lading and customs entries on other forms specified for the purpose, and so on. And who, in these days, is more qualified to fill in forms than the harassed and long-suffering electrical trader or manufacturer ?

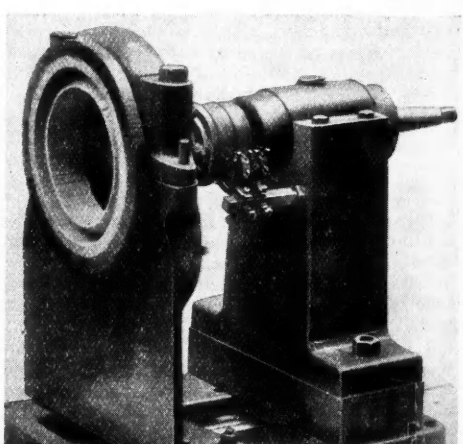
Variable-frequency Alternator

Improvised Potentiometer Type Machine

AN unconventional machine has recently been constructed by the Electroplant Co. (proprietors: G.P.U., Ltd.) Palace of Engineering, Wembley, Middlesex, to the order of De Havillands who needed a potentiometer type variable-frequency alternator to operate between 1 and 50 cycles at constant voltage.

This requirement has been satisfied by furnishing a d.c. input through slip-rings to rotating brushes, fixed axially to a plate that is capable of being revolved at any speed from zero up to 3,000 r.p.m., which is vee-rope driven by a Schrage-type motor.

To avoid the delivery delay of a purchased radial commutator, a slice was cut from a normal commutator and securely clamped to enable a radial face to be machined from the depth of the segments, against which the brushes rotate. The slice chosen has a large number of segments, to the risers of which are connected the tappings of a potentiometer. The a.c. thus produced is taken off from opposite sides of the potentiometer. Since the number of segments is large, the saw-tooth ripple imposed upon the sinusoidal wave-form of the a.c. output is claimed to be quite negligible for ordinary purposes. Various odd materials which are to be found in most electrical workshops were utilized in the construction of this machine, which is an example of improvisation, the only purchased parts being the axial brush holders.



Commutator and slip-ring assembly mounted on bed-plate, without potentiometer or drive

ELECTRICITY SUPPLY

Objection to Ayrshire Plan. Floods at Nottingham.

Aberystwyth.—CONCESSIONS FOR CONSUMERS.—The Council has decided to waive the 15 per cent increase and to give a further 5 per cent rebate on all electricity charges for the quarter ended March 31st. In addition, from April 1st the running charge under the domestic two-part tariff is being reduced by ½d. in all cases where a thermostatically-controlled water heater is used.

Ayrshire.—ECONOMY SCHEME OBJECTIONS.—A deputation from Kilmarnock Trades Council to the Ministry of Fuel reported at a public meeting that the Ayrshire Electricity Board had no power to introduce into Ayrshire any scheme of its own for saving electricity. If any scheme of this kind is put into operation, the Ministry says that it must be part of a national one. The Trades Council objected to a plan proposed by Ayrshire industrialists to divide the county into five zones, each to be without electricity for one day in every week.

Bolton.—LOANS.—The Corporation is seeking permission to borrow £15,633 to acquire electricity showrooms in Knowsley Street, £16,000 for substations and equipment, £10,000 for services, £5,000 for meters, £4,650 for transforming substation and plant for the Eskrick Street district, £13,430 for plant and mains for the Tonge Moor district, and £21,300 for transforming station, etc., in the south-east central district.

HOSPITAL INSTALLATION.—The Corporation Welfare Committee has arranged for the Electricity Department to install electric cooking and heating apparatus at a ward kitchen at Townleys Hospital and is to consider equipping other kitchens similarly.

Darlington. — SWITCHGEAR AND TRANSFORMERS.—The Town Council is to spend an additional £9,710 on switchgear and substation buildings. Additional transformers costing £1,511 are to be bought to deal with the increased load at H. Pease & Co.'s mill.

LOANS SANCTIONED.—Sanction has been received to the borrowing of £1,821 for mains and plant for extending the electricity supply to Neasham Hall, etc., and £1,735 for rectifier equipment to deal with the increased load on the traction system.

Dewsbury. — BULK SUPPLY CHARGES. — The Electricity Committee has approved the appointment of Kennedy & Donkin and Alban & Lamb to act on behalf of the Corporation in negotiations with the Yorkshire Electric Power Co. for securing the adjustments to be made to the bulk supply charges made by the Company to the Corporation on the basis of the "Ilkley" determination.

Fulham.—NEW COLLIERS.—The Burntisland Shipbuilding Co. is to build three Diesel-driven colliers for the Electricity Department.

Guildford. — FURTHER REBATES. — Following the rebates to industrial consumers, the Electricity Committee has now remitted the standing charge of £1,752 in respect of public lighting and £1,700 for water pumping.

Hoylake.—CHANGE OF SYSTEM.—The Urban District Council has approved the change-over from single-phase to three-phase supply of the West Kirby area, at a cost of £46,300.

Hull.—IMPROVED STREET LIGHTING.—The Works Committee has approved a two-year plan for new and modified electric street lighting installations at a cost of £30,000.

Ilford.—SUPPLY IMPROVEMENTS.—The Electricity Committee is to obtain tenders for reinforcing the 6,600-V distribution network and for a bulk supply substation. A supply to the Mossford Park estate will cost £2,838.

Liverpool.—DISTRIBUTION WORKS.—The City Council on April 1st was asked to approve a proposal to borrow £21,855 to purchase from the Ministry of Supply plant and switchgear used to supply electricity to three war factories in the East Lancashire Road area. It is also proposed to spend £50,000 on new services to consumers. Sanction has been obtained to the borrowing of £635,000 for additional transmission lines between Clarence Dock power station and outlying parts of the city.

Middlesex.—SCHOOL LIGHTING.—The County Council Education Committee is to improve lighting at Enfield County School (£890), Tottenham High School (£320), Edmonton Latymer School (£460) and Wood Green County School (£130).

Nottingham. — FLOOD DAMAGE. — It will take some weeks for the Nottingham Electricity Department to ascertain the full extent of the damage done by the floods, states the city electrical engineer (Mr. W. Wadeson). The cost will be met out of revenue. Two local depots were opened in badly affected areas and hundreds of meters were removed from houses in a race against the rapidly spreading flood waters. During the floods last year about a thousand meters were damaged.

Scarborough.—LOANS.—The Town Council is seeking sanction to borrow £8,629 for substations and 11-kV switchgear.

Southport.—CHANGE-OVER.—The Corporation has received sanction to borrow £14,000 for mains in connection with the change-over from d.c. to a.c. in the Birkdale area.

Southwark.—RENTAL WIRING.—The Electricity Committee is seeking sanction to borrow £10,000 for rental wiring.

Stalybridge.—SUPPLY TO WORKS.—The Stalybridge, Hyde, Mossley & Dukinfield Joint Transport & Electricity Board is applying to the Electricity Commissioners for sanction to borrow £11,370 for works in connection with the 33-kV overhead line to the I.C.I. works at Newton.

West Ham.—ELECTRICITY WORKSHOPS.—In connection with the provision of workshop buildings at the rear of the electricity showrooms, the Electricity Commissioners have consented to the borrowing of £17,240 for building, £5,860 for lighting and heating installation, and £4,710 for fixtures and fittings.

Workington.—LIBRARY INSTALLATION.—The borough electrical engineer (Mr. R. H. Jenkins) is to prepare a scheme for electric heating and lighting of the public lending library and reading rooms.

Overseas

India.—POWER STATIONS TO BE LINKED.—The Madras Government, as part of its plan to distribute as much as possible of its electricity over the province, is to link the Mettur and Madras power stations. Four 33/36-kV circuits are needed to connect the stations.

Italy.—OVERHEAD LINE TO SICILY.—It is reported that the Compagnia Nacional Italiana de Empresas Electricas has commenced work on a scheme to supply electric power from the Italian mainland to Sicily by an overhead 135-kV transmission line.

Portugal.—RESTRICTED POWER CONSUMPTION.—The report of the Companhias Reunidas Gas e Electricidade, of Lisbon, for last year shows that, although electric power consumption is still subjected to Government restriction, the sales of power during the past twelve months reached a total of 25·5 million kWh compared with 24·6 million in 1945. It is estimated, however, that if the restrictions were lifted there would be an annual demand for at least 38·5 million kWh.

Spain.—NEW GENERATING STATIONS.—Hydro-electric power stations recently completed include one at Viella with plant capable of producing 70 million kWh a year. The Sociedad Union Electrica Madrilena has put two new plants into operation, one at Almoguera and the other at Zorita, to give an additional annual output of 80 million kWh. During the next three months the Iberica Hydro-Electric Power Co., is expected to complete a new station at Cereda with a yearly productive capacity of 90 million kWh. A new plant known as the Flix on the River Ebro, capable of producing 200 million kWh a year, is also nearly finished as is a larger one at Villacampo with a potential yearly output of 300 million kWh.

TRANSPORT

Bradford.—TROLLEY-BUSES.—The Corporation Transport Committee is to convert the Undercliffe tramways for trolley-bus operation at a cost of £50,000.

Chile.—RAILWAY ELECTRIFICATION. — The United States Embassy, Santiago, has made a detailed report on Chile's railway requirements, in view of the extensive programme of modernization which is under way. The State Railways are expected eventually to electrify the entire main line, a distance of 662 miles, but as for several years the system has been operating at a loss, foreign capital would be needed for the work. The plans to electrify the branch line between Santiago and San Antonio will involve 75 miles of track. Based on 1942 prices, the estimated cost of electrification projected for the San Antonio branch and the 155 miles of the main line, as far as Talca, would be about 13 million U.S. dollars. Electrification of the yards at the Alameda Station, terminal for the San Antonio branch and the main line, is also planned. The present programme calls for electrifying the line between Santiago and Chillan, a distance of 249 miles. Power will soon be available from the hydro-electric plants now being constructed by the Corporacion de Fomento de la Produccion, and investments will be large in such items as locomotives, substation equipment, overhead lines and power lines. The purchase of fourteen electric locomotives is planned by the State Railways for the Santiago-Valparaiso line, four of which will be for heavy freight service, four for light service, and six for switching and yard service.

Portugal. — RAILWAY ELECTRIFICATION. — Several British engineers recently visited Entroncamento to make preliminary investigations for the electrification of the Lisbon-Porto stretch of the Central Portuguese Railway.—*Reuter.*

Sheffield.—CLEARING TRAM LINES.—Since January 24th tramcar snowploughs have operated on 45 nights, the total number of snowplough hours being 1,507.

South Shields.—NEW TROLLEY-BUS ROUTE.—The Town Council has received sanction from the Ministry of Transport to construct a new trolley-bus route from Station Road along Commercial Road to Holy Trinity Church, Laygate, at a cost of £1,807.

Spain.—MORE TROLLEY-BUSES.—The Compania de Tranvias de La Coruna, Spain, has recently put in operation a trolley-bus service between the suburbs of San Amaro and Monelos in place of an old tramway. A fleet of eight Spanish-built vehicles is in use. The replacement of further tram services by trolley-buses is stated to be under contemplation.

West Hartlepool.—CHANGE-OVER TO BUSES.—The trolley-bus service between West Hartlepool and Hartlepool is to be gradually converted to motor buses.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Horticultural Heater

AMONG the products of FARM & GARDEN ELECTRIFICATION, LTD., Havelock Road, Southall, Middx., is the "Alpha" multi-purpose heater. It consists of a strong sheet metal box with a cover that cannot be removed until the electrical connections have been broken. Inside, supported on four bakelite insulators, are two galvanized angle steel rails upon which one or more elements may be rested when the box is to be used simply as a greenhouse heater. Alternatively, they will support special boxes for containing soil to be sterilized, or water to be heated for bulb and root pasteurization.

The rails become busbars when a plug attached to the box cover is inserted into a socket at the back of the box. The heating elements and the containers are sufficiently heavy to maintain good electrical contact when "bridged" across the "live" rails, so avoiding any need to make or break connections after the device has been installed and earthed.

Four 500-W elements can be used at once; inlets at the base and louvre outlets in the cover permit free circulation of air and an ammeter renders the use of a thermometer unnecessary for sterilization. The soil box holds 0·5 cu ft (0·5 cwt) and its sides constitute the electrodes when resting properly on the "live" rails. The water box, of the same capacity, contains two heaters: one to raise the temperature to 110 deg F in 20 minutes and one to maintain it for the time necessary to ensure pasteurization. The necessary contacts and switch are incorporated in the water box and an insulated hole is provided for the insertion of a special pasteurizing thermometer.

Radiant Fire

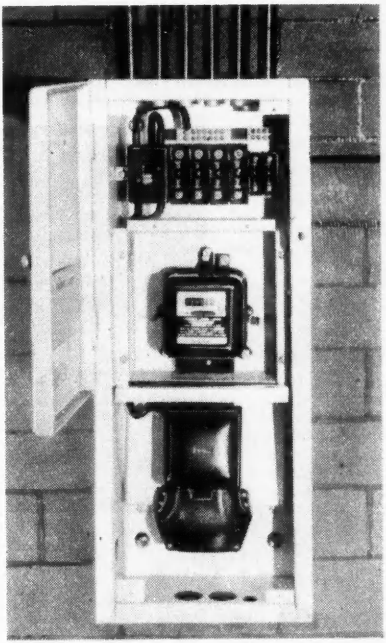
The "Sunray" radiant fire announced by FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1, has die-cast sides supporting a parabolic reflector made of chromium plated brass. The screw-fixed element, which is easily removable, is protected by a curved wire guard and is available in 1 and 2 kW ratings with a bus-bar method of connection in the back-box. The finish is cream and green, while the lifting handle is hinged to swing away from the knuckles.

Cigarette Lighter

A cigarette lighter is being moulded of plastic material in black or assorted colours by the BRITISH ASTRAL CO., LTD., 1, The Chase, Bournemouth Park Road, Southend-on-Sea, and distributed by BROOKS & BOHM, LTD., 90, Victoria Street, London, S.W.1. It is fashioned in the form of a globe supported on an inverted half-sphere, 3·75 in. in diameter and 5·5 in. high. It is intended to be used on a.c. mains at from 200 to 250 V through a miniature step-down transformer, which is built into the globe, and it is designed to operate when tilted in any direction. Thus, when not in use, it must stand on a reasonably level surface so as to prevent the heating element glowing continuously.

House-service Panel

Among the more recent products of SOUTH WALES SWITCHGEAR, LTD., Blackwood, Mon., is a house-service intake panel for small dwellings. It is designed to be built into a wall,



House-service intake panel for small dwellings

forming a tidy box 2 ft 5 in. long by 11 ft 9 in. wide and 5 in. deep with a 1¼ in. dished door.

The shell can be fitted into the wall when the house is being built, leaving the fuse assembly with mask, sealing box, cut-outs and meter tray to be provided later by the local electricity authority as and when needed. The lower end of the shell is removable from the inside, even though built into a wall, which enables the

incoming service cable to be brought forward for easy connection and sealing. There is provision for side entry and for looping the main cable as well as for " under the eaves " wiring.

The meter tray will accommodate any type of watt-hour instrument and spare trays can be drilled for the attachment of new meters at the local authority's stores, then taken along to houses and screwed into position without disturbing the service panel. The latter is suitable for a.c. only, its maximum rating being 60 A at 230 V with four 30-A fuses for " power " circuits and two 5-A fuses for lighting circuits. A substantial earthing block is included for bonding sub-circuit conductors, either lead-covered or separate conductors associated with tough rubber sheathed cables. All main assemblies can be removed from the panel without nuts, which are held by captive pressings, falling into the back of the box.

Multi-purpose Kitchen Aid

Fatigue from a wide range of routine household operations, such as polishing, scrubbing, brushing, scouring, mixing, etc., is eliminated by a device which G.P.U., Ltd., Works Department, Palace of Engineering, Wembley Park, is now arranging to put into production. Besides the operations mentioned the apparatus serves as a dish cloth and towel dryer.

Power is transmitted from a 1/20-H.P. motor to the various attachments through a 6-ft flexible drive, at the end of which is a switch with an interlocking device to ensure that the motor cannot be switched on unless the various attachments are properly fixed. To eliminate all risk of shock the control of the motor is effected through relays by means of a 2-V supply from a transformer. Thus, even if the insulation on the shaft conductors should break down through constant wear, it would be impossible to get a serious shock. The appliance can therefore be used with safety near water taps, etc.

Kitchen labour-saving device, with attachments

The motor, which is of the capacitor type, is of adequate power to perform the required operations yet is easily stopped without hurting the operator, the motor itself or the attachments. It is protected by a sheet-metal casing. A 6-μF capacitor, relays, transformer and a 250-W black heat element are housed in a compartment above. The whole unit, which measures just over 1 ft high and 7 in. in diameter, is arranged for mounting on the wall.

A fan on the shaft of the motor, which is double-ended and runs at 3,000 r.p.m., draws air in at the bottom, cooling the transformer before being warmed by the elements and passed out at the top. Four rails are provided for holding the towels, etc., to be dried. A separate switch controls the heating elements and a pilot lamp in the base serves to illuminate the working area.

The standard attachments include a rotary scouring brush for cleaning saucepans, etc.; a rotary soft brush and mop; a hand brush for clothes, footwear, etc.; a mixing, stirring and dough kneading unit; and an egg whisk and beater. A reciprocating brush, a chuck for tools and a vibro-massage attachment are other units contemplated. A more elaborate apparatus in course of production combines the foregoing operations with the following additional features: Potato peeler and chipper, bread slicer, meat mincer, knife sharpener and polisher, lemon squeezer, scales, hot-cupboard and a double-sided toaster.

Domestic Refrigerator

The latest household refrigerator announced by FRIGIDAIRE, LTD., The Hyde, Hendon, London, N.W., is the model T-4½ of 4·5 cu ft storage capacity. The freezing coils inside the cabinet surround an unusually large chamber, closed by a hinged door, which will make 36 ice cubes (4 lb) three times per day, with means of releasing the frozen trays. Removal of one of the latter provides space for storing ice cream and packaged frozen foods below freezing temperatures. Below the bottom shelf is a porcelain-on-steel " hydrator " receptacle for the moist storage of salads. A temperature regulator is fitted and an interior floodlamp, which is extinguished by a door switch. The welded bat shelves are rust-proof and removable while the one-piece cabinet lining has a stainless porcelain finish. The exterior finish is gloss white with chromium plated hardware.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Aberdare Cables, Ltd., reports a net profit for the year to October 31st last of £20,452 (after providing £47,408 for taxation), as compared with £12,645 for 1944-45. It is proposed to pay a final dividend of 4 per cent, making 10 per cent for the year on increased capital (against 6 per cent for 1944-45). The balance carried forward is £12,279 (against £13,999 brought in).

Sir George Usher (chairman) stated at the annual meeting that in spite of difficulties production had remained at a high level during the period under review and in the few months of the new financial year; in fact, they believed that it was not possible to obtain greater production from the present installed plant. Certain important new equipment should be in operation in a few months' time. The volume of orders continued at a very high rate. Regarding their subsidiary South Wales Switchgear, Ltd., the new factory at Blackwood was in full operation and an important extension had been authorized. Aberdare Cables of South Africa Ltd., had initiated a vigorous selling policy which had already met with great success. A large volume of orders had been secured which at present were being filled from the Aberdare factory. Work on the factory in South Africa was proceeding satisfactorily.

The Metropolitan Electric Supply Co., Ltd., held its annual meeting on April 1st when Major H. Richardson (chairman and managing director), who presided, said that the total electricity supplied to their consumers and to those of their subsidiary companies amounted to 590 million kWh which, with a further 230 million kWh supplied to other undertakings, made a total increase of 86 million kWh as compared with the previous year. Referring to the Electricity Bill, the chairman said that it was difficult to understand why any Government should at such a time risk experimenting on an industry which was part of the very foundation of the industrial life of the nation. He was convinced that the proposed form of national management could only result in the elimination of reasonably healthy competition, initiative and incentive, with the result that, unless subsidized, the majority of consumers would have to pay more for their electricity. He referred to the "gross injustice" of the compensation terms.

Clyde Valley Electrical Power Co.—In the course of his speech at the annual meeting Mr. Robert Robertson (chairman) said that the provisions of the Electricity Bill regarding Scotland could not be viewed with equanimity. For some reason not yet adequately explained the North of Scotland was to be denied the alleged benefits of nationalization, while Southern Scotland, which included practically the whole of the industrial area, was to be tacked on to England.

Regarding the Minister of Fuel and Power's criticism of the capital issue by the company in 1938, Mr. Robertson said that the Minister failed to state that the existing shares quoted at 42s. 6d. fell to 35s. and the shareholder lost 7s. 6d. on each of his two old shares against an increase of 15s. on the new share. It was incorrect that the Electricity Commission protested against the issue. As far as consumers were concerned, the average selling price per kWh did not rise above the 1937 price until 1943, when the tremendous rise in the price of coal began to effect the charge to power consumers.

The Lancashire Electric Light & Power Co., Ltd., reports a profit for 1946, after providing for debenture interest, etc., but before taxation, of £386,494, as compared with £368,978 for 1945, to which is added £15,151 brought in, making £401,645. Income tax requires £169,169 and the final dividend on the ordinary stock is 5 per cent, making 7½ per cent, less tax, for the year (same). The balance carried forward is £15,523. The consolidated profit and loss account of the Lancashire Electric Light & Power Co., Ltd., the Lancashire Electric Power Co., and the Ormskirk Electric Supply Co., Ltd., shows a profit of £386,966 (against £361,443).

The London Electric Supply Corporation, Ltd., reports a gross revenue for 1946 of £1,417,433, as compared with £1,211,091 for the previous year and a profit of £131,193 (against £45,714), to which is added £1,487 brought in and £32,569 interest on investments, making £165,249. It is proposed to pay a final ordinary dividend of 4 per cent, making 6 per cent for the year and to carry forward £70,849. In the previous year the ordinary dividend was 3 per cent, and a further 3 per cent was drawn from No. 2 reserve fund. The sales of electricity during 1946 amounted to 362·6 million kWh, as compared with 306·9 million kWh in 1945.

The Scottish Power Co. reports trading profits for 1946 of £720,585, as compared with £627,997 for the preceding year, and a net revenue of £341,754 (against £304,181). The final ordinary dividend is 5 per cent (same) and a bonus of 1 per cent (same), maintaining the distribution for the year at 9 per cent.

The Woking Electric Supply Co., Ltd.—The directors state that they are legally advised that

under the Electricity Bill they are only permitted to pay a maximum final ordinary dividend of 8¾ per cent less tax. They therefore recommend a final payment at that rate. It was previously announced that the final ordinary dividend would be 9 per cent, less tax, making 15 per cent, less tax, for the year.

The Metropolitan Electric Cable & Construction Co., Ltd., reports a net profit for 1946 of £77,624, as compared with £33,354 for 1945. Tax requires £53,000 and deferred repairs £2,500. The final dividend is 10 per cent, again making 15 per cent for the year, and £65,311 is carried forward (against £48,137 brought in).

The Telegraph Construction & Maintenance Co., Ltd., reports a net profit for the past year of £82,023, as compared with £53,985 for the preceding year. The dividend for the year is maintained at 10 per cent by a final payment of 5 per cent.

The Delhi Electric Traction & Supply Co., Ltd., has announced that its undertaking was transferred to the Delhi Provincial Government on March 3rd. A valuation is being made by Merz & McLellan on behalf of both parties and a payment on account has been made subject to revision upwards or downwards. The company is not yet able to say what the final payment will be.

The Hackbridge & Hewittic Electric Co., Ltd.—The Anglo-Scottish Amalgamated Corporation announces that application will shortly be made to the Council of the Stock Exchange for permission to deal in 350,000 4 per cent cumulative preference shares of £1 each in the Hackbridge & Hewittic Electric Co.

A. Reyrolle & Co., Ltd., report a profit for 1946 of £121,406, as compared with £96,701 for the preceding year. The final ordinary dividend is again 7½ per cent, maintaining the distribution for the year at 12½ per cent.

New Companies

James G. Medlock & Sons, Ltd.—Registered March 27th. Capital, £5,000. To acquire the business of a wholesale distributor of electrical equipment now carried on by J. G. Medlock at 578-580, Green Lanes, N.8. Directors: J. G. Medlock, J. H. Medlock, R. J. Medlock and E. W. Medlock. Regd. office: 580, Green Lanes, Harringay, N.8.

English Electric Valve Co., Ltd.—Registered March 28th. Capital, £1,000. Electrical, radio, television, radar, mechanical, hydraulic and general engineers, manufacturers of, and dealers in, electrical, radio and other apparatus, etc. Subscribers: J. H. Calverley and W. E. Woollon. Solicitors: Linklaters & Paines, 97, Cannon Street, E.C.4.

Star Electro Carbons, Ltd.—Registered March 28th. Capital £7,000. To acquire the business of manufacturers and vendors of electrical and other components now carried on by Starelcarb, Ltd., at 20, Albion Hill, Loughton, Essex. Directors: W. R. Preston, W. H. Bennett, S. Hoare and A. G. Izatt. Regd. office: Trafford House, Trafford Road, Leicester.

Duncan Little, Ltd.—Registered March 27th. Capital, £100. Manufacturers of, agents for and dealers in, electrical and wireless goods. Directors: G. S. A. Feiling and Capt. N. Roseman. Regd. office: 4, King's Bench Walk, E.C.4.

Fleming Electrical Corporation of Great Britain, Ltd.—Registered February 28th. Capital, £5,000. Dealers in, and manufacturers of, intercommunication telephones, wireless and television, etc. Subscribers: K. E. Worsdall and P. M. Cordell. Secretary: V. M. Winter, 89, Kingsway, W.C.2.

J. Jas. Peters, Ltd.—Registered February 28th. Capital, £4,000. Electricians, electrical contractors, electrical, mechanical and radio engineers, etc. Directors: J. J. Peters, E. Peters, Mrs. M. Peters, and J. E. Booker. Regd. office: 247, Old Chester Road, Birkenhead.

Smurthwaite Engineering Co., Ltd.—Registered February 10th. Capital, £5,000. To acquire the business of electrical and electronic engineers now carried on by R. I. Cowley and W. H. Cowley at Harmony Works, Wallington, Surrey. Directors: H. L. Good (governing director), R. I. Cowley, W. H. Cowley, and F. W. Smurthwaite. Regd. office: Market Chambers, Watford.

Increases of Capital

R. J. Kemp & Co., Ltd., have increased their capital by £10,000 beyond the registered capital of £10,000.

Scientific Radio & Instruments, Ltd.—Increased by £13,000 beyond the registered capital of £2,000.

Electrical Power Specialists (Hendon), Ltd.—Increased by £1,500 beyond the registered capital of £3,000.

Waite & Son, Ltd., have increased their capital by £40,000 beyond the registered capital of £70,000.

William Steward & Co., Ltd.—Increased by £4,200 beyond the registered capital of £5,800.

Bankruptcies

W. A. Roderick, 25 Adare Street, Bridgend, Glam., electrical engineer.—Last day for receiving proofs for dividend April 19th. Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver.

Liquidations

Indurite Moulding Powders, Ltd.—Winding up voluntarily. Joint liquidators, H. N. Butler, 4, St. Mary Axe, London, E.C.3, and R. D. Brewis, 56, Cannon Street, London, E.C.4. (This notice is purely formal; the company is being wound up only for the purpose of reconstruction.)

STOCKS AND SHARES

STOCK EXCHANGE markets pursue the course usually marked out for them in advance of the Budget. Prices keep steady on the whole, but there is a noticeable curtailment of activity on the part of purchasers, with the result that sales for deceased accounts and other realizations have more effect upon prices than they do when business is more general. There are few outstanding features to record so far as price fluctuations are concerned, and business runs on jog-trot lines. New issues continue to be poured out at a rate which might seem likely to strain the resources of available capital to no small extent, but, as a matter of fact, most of them are successful in their appeals for capital, although the appetite for these newcomers is lessening.

Budget Considerations

Foremost among the Budget anticipations which have lately been restraining investment activity is the question of a successor to E.P.T. This tax ceased to operate from the beginning of the current year. ' Few people are so sanguine as to expect that company profits will escape some fresh contribution, in one form or another, to make up at least part of the loss to the Exchequer. A popular guess estimates an increase in the profits tax from 5 to 15 per cent. Such a change in the tax basis would be popular in direct ratio to the amount of E.P.T. formerly paid by individual companies. Less has been heard lately about dividend limitation, and more about a tax on capital profits arising from share transactions. Some reduction in the income tax is wishfully thought likely to result from the need to invest the Budget with the necessary element of incentive to work.

Price Fluctuations

Save for a rally to 31s. 9d. in A. C. Cossor shares, the radio list is heavy. E. K. Cole keep dull at 24s. E.M.I. eased off to 24s. 9d. Scophony gave way to 7s. 6d. Elsewhere, Metal Industries " B " at 55s. and Christy Bros. at 4⅛ are both down 2s. 6d. Tube Investments gained a similar fraction at 6¼; Victoria Falls at 6⅛ are equally better. British Electric Traction deferred is 40 higher at 1,225. Cable & Wireless preference fell back to 123½, the ordinary remaining at 154½. Siemens at 37s., Ericsson Telephones at 46s. 3d. and Mather & Platt at 58s. are all 6d. to the good. Peto Scott at 7s. 6d. also gained a few pence.

De la Rue

Thomas de la Rue made a new issue of shares at £9 per share, giving one new share in respect of three old shares held. The allotment was made on the basis of the shares being £1 each, whereas the market is dealing in split shares of 5s. each, the result being, of course, that the offer of new shares was actually at 45s. for each 5s. unit. Confusion immediately arose in the dealing. Some holders assumed that the allotment was made in respect of the split shares of 5s. each, and the ensuing complications required a good deal of straightening out. The market started dealing in the new shares at 9s. 6d. premium over the issue price of 45s. per 5s. unit. There was a prompt rise to 13s. premium, at which a few shares came in, the premium easing off a trifle.

Telegraph Construction

For the tenth successive year, Telegraph Construction & Maintenance have brought the annual distribution up to 10 per cent. Over the period, the issued ordinary capital has been approximately doubled, at £681,600, without taking into account the 100,000 shares now to be issued to Johnson & Phillips in exchange for 67,000 of that company's shares. Approval was given a month ago to this exchange which, it will be remembered, had the object of strengthening the business and technical association between the two companies. According to the preliminary statement, net profits of Telegraph Construction for 1946 rose to £82,000, which compares with a figure of £54,000 for 1945. To these figures the price of the shares responded with an advance of 2s. to 56s. 3d.; Johnson & Phillips shares are unchanged at £4.

Home Electricity Supply

Prices of ordinary shares in the Home electricity supply group remain unchanged. The holder who decided to dispose of his interest, did so some time ago, and the present proprietary of shares in the electricity supply industry can be regarded, for all practical purposes, as permanent investors. They have protested, and continue to protest, against the loss of income which they will suffer by reason of the industry being taken over by the Government. Compensation on the lines already indicated means that in every case the holder will suffer a diminution of income as a consequence of nationalization.

Electricity Debentures

Recovery in the gilt-edged market has again contracted the supply of well-secured preference and debenture stocks. Prices have hardened appreciably. Debentures in the electricity supply market, however, are still offered fairly freely at 2 to 3 points below their estimated compensation prices. Metropolitan Electric 3 per cents, for instance, can be bought at 97 and are calculated to have a " take-over " value of par. Stocks of this character remain supported largely by institutional buyers. Other debentures on offer in the market include North Eastern Electric 3¼ per cents at 99½ and Northmet Power 3½ per cents at 97½. The compensation prices are calculated as 102 $\frac{13}{16}$ and 100½ respectively.

Forthcoming Events

Monday, April 14th.—BIRMINGHAM.—Midland Institute, 6 p.m. I.E.E. (South Midland Centre). Faraday Lecture by J. Hacking.

CARDIFF.—South Wales Institute of Engineers, 5 p.m. I.E.E. (Western Centre). "Commercial Development of Electricity Supply as a Consumer Service," by C. T. Melling.

Tuesday, April 15th.—LONDON.—Institution of Electrical Engineers (Radio Section), 5.30 p.m. Discussion on "Does Standardization Conflict with Progress?", opened by J. W. Dalgleish.

Savoy Hotel, 12.45 for 1 p.m. British Plastics Federation. Annual luncheon.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Light and Colour, as Applied to Works Equipment," by W. Robinson.

School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6 p.m. Illuminating Engineering Society. Papers on "Problems Associated with Searchlights."

MANCHESTER.—Engineers' Club, 6 p.m. I.E.E. (North-Western Measurements Group.) "Calibration of Uniform-Field Spark-Gaps for High-Voltage Measurement at Power Frequencies" and "The Design of an Ellipsoid Voltmeter for the Precision Measurement of High Alternating Voltages," by F. M. Bruce.

BELFAST.—Queen's University, 6.45 p.m. I.E.E. (Northern Ireland Centre). "Recent Progress in the Design of the High-Voltage Overhead Lines of the British Grid System," by W. J. Nicholls.

SOUTHSEA.—Kimbells' Restaurant, 7 p.m. I.E.E. (Southern Centre). Annual dinner-dance.

Wednesday, April 16th.—LONDON.—Connaught Rooms, W.C.2, 12.30 for 1 p.m. Institution of Electrical Engineers (Installations Section). Luncheon.

Institution of Electrical Engineers (Transmission Section), 5.30 p.m. "Record of Experience on the Irish Electricity Supply System," by A. Burke, R. C. Cuffe and W. O'Neill.

SHEFFIELD.—Royal Victoria Station Hotel, 6.15 p.m. I.E.E. (Sheffield Sub-Centre). "The Heat Pump," by J. A. Sumner.

Thursday, April 17th.—SWANSEA.—Guildhall, 6 p.m. I.E.E. (Western Installations Group). "Engineering Applied to the Design of Domestic Water-Heating Installations of the Solid-Fuel/Electric Type," by R. Grierson and Forbes Jackson. Joint meeting with the West Wales (Swansea) Sub-Centre.

Friday, April 18th.—MANCHESTER.—Engineers' Club, Albert Square, 6.45 p.m. I.E.E. (North-Western Students' Section). "Power Station Layout," by J. C. Goward.

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). "Portable Photometers," by J. S. Preston.

NEWCASTLE-ON-TYNE.—King's College, 6.30 p.m. I.E.E. (North-Eastern Students' Section). "Compressed Air Equipment for Air-Blast Circuit-Breakers," by J. L. Morris.

Saturday, April 19th.—LONDON.—I.E.E. (London Students' Section), 9.30 a.m. Visit to De La Rue Plastics, Ltd., Walthamstow Avenue, London, E.4.

Monday, April 21st.—LONDON.—Central Hall, Westminster, S.W.1, 6 p.m. Institution of Electrical Engineers. Faraday Lecture by J. Hacking.

LIVERPOOL.—Royal Institution, Colquitt Street, 6 p.m. I.E.E. (Mersey and North Wales Centre). Annual general meeting.

Tuesday, April 22nd.—CAMBRIDGE.—Cambridgeshire Technical College, 6 p.m. I.E.E. (Cambridge Radio Group). "Dielectric Phenomena at High Radio Frequencies," by Prof. Willis Jackson.

MANCHESTER.—College of Technology, 7.30 p.m. I.E.E. (North-Western Centre). Faraday Lecture by J. Hacking.

GLASGOW.—Royal Technical College, 6.15 p.m. I.E.E. (Scottish Centre). "The British Grid System in Wartime," by J. Hacking and J. D. Peattie.

RUGBY.—Corporation Electricity Showroom, 6.45 p.m. I.E.E. (Rugby Sub-Centre). Annual general meeting and informal meeting.

Battery Vehicles for Airports

IN a recent speech Mr. G. S. Lindgren, Parliamentary Secretary, Ministry of Civil Aviation, said that vehicles on airfields should give the driver a good all-round view, be manœuvrable in confined spaces, and have well-diffused lighting. He emphasized the importance of low fire risk. A demonstration of electric vehicles was given at Heathrow Airport on March 24th which Mr. Lindgren attended. Among others present were Air Marshal Sir John d'Albiac, Commandant of London Airport, Mr. R. C. Pugh, airport manager, and representatives of the Air Ministry and the principal airlines. For the demonstration Crompton Parkinson, Ltd., had assembled three "Morrison-Electricar" vehicles (two 1-ton and one 10-cwt). These were of the standard type and were not specially designed for airfield transport. The demonstration showed the high degree of manœuvrability and the simplicity of driving. The full forward control of the vehicles gave excellent visibility, and the comparatively low maximum speed was also considered an advantage. In the coldest weather it can be driven immediately it is required. The range of a standard vehicle from one battery charge is more than enough to cover the daily mileage involved. The vehicle is readily adaptable for carrying passengers, baggage and freight, maintenance equipment, and as a mobile canteen.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

AKTIEBOLAGET Gotaverken.—" Gas turbine power plants." 21490/44. November 22nd, 1943. (586238.)

Allmanna Svenska Elektriska Aktiebolaget.—" Compressed air-blast electric circuit breakers with a plurality of series connected breaking gaps." 23103/44. November 24th, 1943. (586244.)

Alltools, Ltd., A. Graves and T. J. Dawes.—" Ionization chambers, Geiger-Müller tubes and the like." Cognate applications 9166/45 and 30461/45. April 12th, 1945. (586266.) Ditto 31982. (Divided out of 586266.) (586267.)

E. Aughtie.—" Equipment for use with electrical resistance strain gauges." 19865. November 29th, 1943. (586229.) Ditto 7678/46. (Divided out of 586229.) (586268.)

Automatic Telephone & Electric Co., Ltd., R. Taylor and G. T. Baker.—" Telephone systems." 24550. December 8th, 1944. (586380.)

British Broadcasting Corporation and J. L. Bliss.—" Measurement of standing waves on electrical transmission lines." 22472. November 14th, 1944. (586088.)

British Insulated Cables, Ltd., J. L. Packer and H. M. Steward.—" Apparatus for the extrusion of non-metallic plastic materials." 887. January 17th, 1944. (586158.) Ditto. 2872/46. (Divided out of 586158.) (586386.) Ditto. 2873/46. (Divided out of 586158.) (586387.)

British Thomson-Houston Co., Ltd.—" Immersion igniter valves controlling current supply to load circuits such as welding circuits." 2200/43. February 13th, 1942. (586350.)

British Thomson-Houston Co., Ltd.—" Magnetic induction accelerators." 8879/43. June 2nd, 1942. (585992.) " Photoflash lamps." 16488/43. October 10th, 1942. (586129.) " Apparatus for starting and controlling electric discharge devices." 762/43. January 22nd, 1942. (586152.)

British Thomson-Houston Co., Ltd., and G. H. Dyer.—" Gramophone pick-ups or recorders." 25034. December 13th, 1944. (586102.)

British Thomson-Houston Co., Ltd., and R. Snadow.—" Mouldable plastic compositions." 7763. May 15th, 1943. (585991.)

British Thomson-Houston Co., Ltd., K. J. R. Wilkinson and T. H. Scott.—" Triggered spark gaps." 6088. April 15th, 1943. (586153.)

British Thomson-Houston Co., Ltd., C. J. Milner, W. D. Sinclair and L. Rushforth.—" Electron-discharge devices of the velocity modulated type employing resonators." 13995. October 30th, 1941. (586121.)

British Thomson-Houston Co., Ltd., L. J. Davies, L. Rushforth, W. D. Sinclair and C. J. Milner.—" Electron-discharge devices of the velocity modulation type employing resonators." 13949. October 29th, 1941. (586120.)

Callender's Cable & Construction Co., Ltd., and G. M. Hamilton.—" Electric cables." 323. January 5th, 1940. (586349.)

Callender's Cable & Construction Co., Ltd., E. Tunnicliff, J. Taylor and H. D. James.—" Covering of electric wires and the like." 16599. August 31st, 1944. (586172.)

Sir M. Campbell.—" Electric torches." 10415. May 30th, 1944. (586357.)

J. Collard and S. Hill.—" Coupling of electric waveguides." 9623. May 18th, 1944. (586317.)

A. C. Cossor, Ltd., and A. Levin.—" Electrical apparatus for comparing time intervals." 18606. September 28th, 1944. (586068.)

Sir W. Crawford & Partners, Ltd., and T. W. Kennedy.—" Portable electric heaters." 21948. November 8th, 1944. (586084.)

T. G. Farish.—" Electric clocks." 24811. December 11th, 1944. (586345.)

Ferranti, Ltd., and W. N. Duffy.—" Electric radiators and reflectors therefor." 12262. June 28th, 1944. (586195.)

A. Freckleton.—" Securing of insulating material to conducting material." 21516. November 2nd, 1944. (586082.)

General Electric Co., Ltd., and E. Friedlander.—" Electromagnetic pumps." 137. January 4th, 1943. (586276.)

General Electric Co., Ltd., and A. S. Gladwin.—" Carrier telephone systems and the like." 12479. June 30th, 1944. (586165.)

General Motors Corporation.—" Control systems for electric motors." 18185/44. October 16th, 1943. (586067.)

Ges. zur Forderung der Forschung auf dem Gebiete der Technischen Physik an der Eidgenossischen Technischen Hochschule.—" Circuit arrangement for separating weak electrical impulses from an accompanying variable noise voltage." 5369/44. March 4th, 1943. (586284.)

Hanovia, Ltd., J. W. Kolbert and G. W. Brench.—" Ultra-violet and like radiators." 13088. July 8th, 1944. (586043.)

W. T. Henley's Telegraph Works Co., Ltd., and H. A. MacDonald.—" Vulcanizing or like heat treatment of the rubber or other coverings of insulated electric wires." 16916. September 5th, 1944. (586209.)

W. C. Holmes & Co., Ltd., W. Sykes, Electric Construction Co., Ltd., and J. C. Milne.—"Electrical precipitation plant." 22367. November 13th, 1944. (586179.)

L. S. Humphries and R. W. Bill.—" Electrical snap action switch mechanisms." 123. January 2nd, 1945. (586384.)

L. S. Jeffay.—" Electric and/or gas fires or radiators." Cognate applications 11040/44 and 13963/44. June 9th, 1944. (586037.)

Marconi's Wireless Telegraph Co., Ltd.—" Secondary electron emitting electrodes, and electron-discharge devices embodying such electrodes." 1588/44. January 27th, 1943. (586000.) " Intelligence transmission system using modulated pulses." 10413/44. May 29th, 1943. (586034.) " Angle modulated carrier wave receivers." 15303/44. August 11th, 1943. (586051.) " Electron-discharge valve amplifiers." 662/44. January 13th, 1943. (586138.)

D. A. Marsh, and E. A. Stuart.—" Safety fuses for electric circuit systems." 21816. November 7th, 1944. (586240.)

Metropolitan-Vickers Electrical Co., Ltd., and K. Baumann.—" Bladed drum-type rotor constructions operating under high-temperature conditions." 14019. July 21st, 1944. (586200.)

Metropolitan-Vickers Electrical Co., Ltd., and D. R. Davies.—" Polyphase metalclad electrical switchgear." 25233. December 15th, 1944. (Addition to 492395.) (586253.)

Metropolitan-Vickers Electrical Co., Ltd., W. Merchant and G. Jenson.—" Axial-flow gas compressors, more particularly but not exclusively for internal-combustion turbine plant for aircraft propulsion." 12241. June 27th, 1944. (586041.)

F. Neumann.—" Electrostatic voltmeters." 25583. December 20th, 1944. (586382.)

Oldham & Son, Ltd., and H. Holt, jun.—" Device for protecting electrical contacts against unauthorized access." 11816. June 21st, 1944. (586039.)

Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—" High-frequency coil." 16527/43. October 8th, 1942. (585995.)

E. S. V. Pattamaly.—" Electron oscillators." 10662. June 2nd, 1944. (586321.)

A. F. Pearce.—" Grids associated with hollow electrical resonators." 13031. September 15th, 1942. (586151.)

Philco Radio & Television Corporation.—" Voltage regulator." 21133/44. October 28th, 1943. (586076.) " Electric signal wave systems particularly for use in television systems and the like." 12424/43. July 31st, 1942. (586154.)

Philips Lamps, Ltd., H. De Wilde and A. J. Pinkney.—" Process for the production of facing bodies attached to a support." 14602. July 31st, 1944. (586233.)

H. B. Prentice and J. W. Ginn.—" Double, single or multipole electric switches." 22566. November 15th, 1944. (586089.)

Pritchett & Gold & E.P.S. Co., Ltd., and E. S. Chapman.—" Electric storage batteries." 20143. October 18th, 1944. (586072.)

A. Reyrolle & Co., Ltd., J. Daley and A. J. Brown.—" Electrical synchronizing apparatus." 13507. July 14th, 1944. (586326.)

A. V. Roe & Co., Ltd., and J. Roberts.—" Electrical means for facilitating the synchronization of the speeds of engines or machines." 16151. August 24th, 1944. (586053.)

Standard Telephones & Cables, Ltd.—" Methods of and means for visually reproducing signals." 18738/44. November 1st, 1943. (586019.) "Electric full-wave rectifiers." 24103/44. December 6th, 1943. (586098.) " Cathode-ray oscillograph tubes." 25210/44. December 20th, 1943. (586104.) " Arrangements for selecting electric pulses from a pulse train in accordance with their amplitude." 18521/44. December 15th, 1942. (586176.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Electrical synchronization of rotary shafts." 21386. December 21st, 1943. (586136.)

Standard Telephones & Cables, Ltd., and B. B. Jacobsen.—" Means for measuring difference in frequency of a.c." 5267. April 1st, 1943. (586278.)

Standard Telephones & Cables, Ltd., and S. G. Tomlin.—" Ultra-high-frequency electric oscillators." 17310. December 4th, 1942. (586275.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton.—" Radio-echo systems for measuring rate of approach or receding of moving objects." 13078. October 10th, 1941. (585988.) " Arrangements for determining distance by means of electromagnetic waves." 13279. October 15th, 1941. (586119.) " Determining distance by means of electromagnetic waves." 3840/43. October 15th, 1941. (Divided out of 586119.) (586126.)

Standard Telephones & Cables, Ltd., N. H. Collings and R. J. H. Beverton.—" Electrically conducting adhesive." 10622. June 2nd, 1944. (586320.)

Standard Telephones & Cables, Ltd., C. W. Earp and J. D. Weston.—" Electric wave modulating devices and electronic switches." 2028. February 3rd, 1944. (586139.)

Standard Telephones & Cables, Ltd., J. H. Fremlin and C. H. Foulkes.—" Velocity modulated electron discharge devices." 382. January 9th, 1942. (586148.)

Standard Telephones & Cables, Ltd., J. H. Fremlin and T. A. J. Jaques.—" Tunable electric resonators for ultra-high frequencies." 13895. October 2nd, 1942. (586122.)

Standard Telephones & Cables, Ltd., J. H. Fremlin, S. G. Tomlin and D. C. Rogers.—" High-frequency electric oscillators." 14226. October 9th, 1942. (586123.)

Standard Telephones & Cables, Ltd., C. P. Smith and D. Bannock.—" Contacts of electromagnetic relays." Cognate applications 10027/44 and 19791/44. May 24th, 1944. (586286.) Ditto 26234/46. (Divided out of 586286.) (586308.)

Standard Telephones & Cables, Ltd., C. N. Smyth and A. S. Wade.—" Thermionic valves." 20559. December 8th, 1943. (586351.)

Standard Telephones & Cables, Ltd., C. N. Smyth and D. C. Rogers.—" Arrangements for measuring radiant energy." 1155. January 20th, 1944. (586312.)

Taylor, Tunnicliff & Co., Ltd., and P. Cooper.—" Electric insulators." 12689. May 21st, 1945. (586065.)

Taylor, Tunnicliff & Co., Ltd., and W. Vose.—" Electrically-conductive ceramic coating or composition." 4322. February 20th, 1945. (Addition to 577748.) (586064.)

Telephone Manufacturing Co., Ltd., J. W. Holt and R. St. G. Terry.—" Insulation of coils for electrical apparatus." 3680. February 28th, 1944. (586001.)

Venner Time Switches, Ltd., and W. F. Horgan.—" Time switches." 20187. October 18th, 1944. (586178.)

E. L. C. White, I. J. P. James and J. E. Best.—" Thermionic valve circuits for modifying potentials." 645. January 12th, 1944. (586137.)

J. Windrum and E. O. Mathieson.—" Stranded electrical conductors." 671. January 13th, 1944. (585999.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses.

Cleethorpes.—April 30th. Electricity Department.—L.v. cables. (March 28th.)

Dartford. — May 10th. Corporation. Additional lighting points in Council houses. (April 4th.)

Ebbw Vale.—April 21st. Electricity Department. Electricity meters for year ending March 31st, 1948. (See this issue.)

Edinburgh. — April 25th. City Council. Control and indication equipment at Portobello station. (March 28th.)

Epsom and Ewell.—April 14th. Electricity Department. H.v. and l.v. cable. (April 4th.)

Hastings.—May 5th. Electricity Department. One 11-kv switchboard comprising five units. (See this issue.)

Heston and Isleworth.—April 26th. Electricity Department. One 10-cwt enclosed van type electric vehicle. (See this issue.)

Heywood.—April 21st. Electricity Department. One 5,000-kVA transformer and 5,000 yd of 11-kV cable. (March 28th.)

Madras.—May 1st. Government Electricity Department. Interconnector and auxiliary transformers for Basin Bridge " B " power station. (March 28th.)

Maidstone. — April 19th. Town Council. Electrical installations in 112 houses, Shepway Farm housing estate, second portion. Borough surveyor, Palace Avenue.

Manchester.—April 21st. Electricity Committee. Meters and street lighting lanterns. (April 4th.)

Newcastle-under-Lyme.—April 29th. Electricity Department. One 500-kVA rectifier with transformer, substation switchgear and transformers. (April 4th.)

Plymouth.—May 10th. Electricity Supply Department. One 100-ton overhead electric travelling crane. (See this issue.)

Rhondda.—April 26th. Electricity Department. Materials for the year ending March 31st, 1948. (March 28th.)

Sale.—May 5th. Electricity Department. Cables and transformers. (April 4th.)

Salford.—April 16th. Electricity Department. Electrical installations in sixteen bungalows and 172 houses. (April 4th.)

May 3rd. Metalclad switchgear, transformers, cable and neutral earthing resistances. (March 28th.)

Spenborough.—May 2nd. Electricity Department. Mercury discharge street lighting equipment. (See this issue.)

Orders Placed

Croydon.—Corporation. Accepted. Croydon " B " power station: Steam and feed piping.—Aiton & Co. Steam-raising plant (four boilers, etc.).—Simon Carves. Six cooling towers.—Concrete Piling.

Darlington.—Town Council. Accepted. Six transformers (£2,352).—Yorkshire Electric Transformer Co.

Hull.—Housing Committee. Accepted. Electrical installations in fifty-eight houses on the East Hull estate.—F. P. Tarran (£1,225); Central Electrical Engineering Co. (£1,010).

Manchester.—Electricity Committee. Accepted. Annual contracts for cookers.—Revo Electric Co., English Electric Co., and Simplex Electric Co. Batteries and charging equipments.—Tudor Accumulator Co.

Newcastle-on-Tyne.—City Council. Accepted. Electrical repairs to Corporation houses during the next six months.—B. Berrie.

Sheffield.—Electricity Committee. Accepted. Reactor (£10,080).—B.T.H. Co. Supplies for a further twelve months:—Cables.—W. T. Glover & Co. Switchgear.—Crompton Parkinson. Transformers.—Bonar Long & Co.

Tynemouth.—Corporation. Accepted. Electrical installations in thirty-eight houses at New York and sixty-two houses on the Broadway site.—Neil & Partners.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arbroath.—Foundry extensions; D. Fraser & Sons, Ltd., Stobcross.

Ashton-under-Lyne.—Permanent houses (54), Crowhill site; borough surveyor.

Aspull.—Houses (58) for U.D.C. (£72,626); D. A. Ablett & Sons, Ltd., builders, Sovereign Road, Wigan.

Barnard Castle.—Additions to penicillin factory for Glaxo Laboratories, Ltd.

Bedford.—Houses (74), Mile Road (£87,123); T. Lowe & Sons, Ltd., builders, Cherry Street, Birmingham, 2.

Blackburn.—County junior school, Longshaw (£64,000); borough engineer.

Blyth.—Houses (340), Bebside; borough engineer.

Bolton.—Houses (358), Lever Edge Lane site; Wm. Townson & Sons, Ltd., builders, Park Hill Street.

Bradford.—New central library and concert hall (£762,500) and branch libraries (£57,670); borough engineer.

Bristol.—New linen store and kitchen extensions at Southmead Hospital (£23,850); city engineer.

Broughton.—Research laboratory, Lower Broughton Road, for British Cotton & Wool Dyers' Association; Spencer & Clarke, Ltd., Elton Saw Mills, Bury.

Bury St. Edmunds.—Houses (48), Mildenhall Road (£57,211); Bury St. Edmunds Development Co., Ltd., Vinery Road.

Chester.—Factory, Thornton-le-Moors; Shell Petroleum Co., Ltd.

Chislehurst and Sidcup.—Permanent houses (116) and flats (24), Royal Park Avenue; U.D.C. surveyor, Council Offices, Main Road.

Coventry.—Temporary shops Broadgate (£38,200), and completion of schools (£104,492); city engineer.

Deudraeth.—Houses (48) for R.D.C.; W. H. Roberts (Builders & Contractors), Ltd., 50, King Street, Wallasey.

Dudley.—Houses (52), Tansley Hill; Wm. Lindley Ltd., Builders, Flood Street.

Dunfermline.—Miners' houses (150), Woodmill; Scottish Special Housing Association, Ltd.

Durham.—Aluminium houses for miners at Sunderland, Easington and Houghton-le-Spring; Ministry of Works, Newcastle-on-Tyne.

Ellesmere Port.—Houses (70), Stanney estate; T. Warrington & Sons, 82, Station Road.

Gateshead.—Houses on a forty-acre site at Wrekenton; borough engineer.

Brewery in the Askew Road area; Rowells, Ltd., wine and spirit merchants, 143, High Street.

Glasgow.—Two factories, Glasgow and Larkhall; Imperial Tobacco Co. (of Great Britain & Ireland), Ltd.

Hanley.—Factory for disabled persons; G. & J. Seddon, Ltd., builders, 55, Duke Street, Fenton, Staffs.

Headquarters, Marsh Street (£25,000), for North Staffs Boy Scouts' and Girl Guides' Association; E. Forshawe & Greaves, architects, 45, Trinity Street.

Heanor.—Permanent houses (70), Marlpool Farm estate; R. Archer, U.D.C. surveyor, Council Offices, Heanor, Nottingham.

Ilford.—Secondary school, Grove Road; borough engineer.

Kidderminster.—Houses (92) and bungalows (26); R.D.C. surveyor, Land Oak House.

Litherland.—Houses (58), Church Road; U.D.C. surveyor, Town Hall.

Ludlow.—Houses (50), adjoining Sandpits Lane; borough surveyor, Municipal Offices.

Middlesbrough.—A number of Board of Trade factories; Matkin & Hawkins, Barclays Bank Chambers, Sunderland.

Newcastle-on-Tyne.—New wing at the Royal Victoria Infirmary (£30,000); Dr. Sanderson.

North Riding.—School building programme including schools at Ormesby, Scalby, Scarborough, Whitby and Catterick, for the C.C.; county architect, County Hall, Northallerton.

Nottingham.—Dwellings for aged persons (31), with flats, warden's house, communal centre, etc., Helston Drive, Broxstowe; H. Kellett Ablett, housing architect, The Guildhall.

Poole.—Brick houses (50), Bourne estate, Herbert Avenue, Parkstone; J. R. Barron, borough engineer.

Seaham.—Factory for M. Jackson & Sons (Clothiers), Ltd., Newcastle-on-Tyne.

Sheffield.—Factory, Sylvester Street and Arundel Street; J. M. Jenkinson, architect, 18, Norfolk Row.

Stockton-on-Tees.—Extensions to the Corporation Quay and erection of a warehouse (£68,000); W. G. Turriff, Ltd., builders, Leamington Spa.

Sunderland.—Furniture factory, Nile Street, for J. Linskill; H. E. Pitt, Ltd., builders, Leopold Street, Millfield, Sunderland.

Crematorium, Bishopwearmouth Cemetery; borough engineer.

Tynemouth.—Factory for Torday & Co., Ltd.; Stephen Easten, Ltd., builders, Westgate Grange, Newcastle-on-Tyne.

Wembley.—Flats (60), in five blocks, Forty Avenue; borough treasurer, Town Hall.

Weymouth.—Houses (52), Lanehouse Rocks Road (£66,806); R. V. Curtis, builder, 28, Dorchester Road.